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OF THE

AMERICAN

OPHTHALMOLOGICAL SOCIETY.

VOL. III.

1880—1884.

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TRANSACTIONS

OF THE

AMERICAN

OPHTHALMOLOGICAL SOCIETY

Sixteenth Annual Meeting.

NEWPORT, 1880.

NEW YORK:
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1880.

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MEMBERS

OF THE

AMERICAN OPHTHALMOLOGICAL SOCIETY.

ACTIVE MEMBERS.

Dr. F. W. Abbott	Buffalo, N. Y.
Dr. C. R. Agnew	New York, N. Y.
Dr. Joseph Aub	Cincinnati, O.
Dr. Edwin W. Bartlett	Milwaukee, Wis.
Dr. Charles S. Bull	New York, N. Y.
Dr. F. Buller	Montreal, Canada.
Dr. Peter A. Callan	New York, N. Y.
Dr. W. H. Carmalt	New Haven, Conn.
Dr. David Coggin	Salem, Mass.
Dr. H. Culbertson	Zanesville, O.
Dr. W. S. Dennett	Boston, Mass.
Dr. Hasket Derby	Boston, Mass.
Dr. Richard H. Derby	New York, N. Y.
Dr. John H. Dix	Boston, Mass.
Dr. Lewis S. Dixon	Worcester, Mass.
Dr. Stephen Dodge	Halifax, Nova Scotia.
Dr. Abram Du Bois	New York, N. Y.
Dr. E. Dyer	Pittsburg, Pa.
Dr. E. T. Ely	New York, N. Y.
Dr. Henry C. Eno	New York, N. Y.
Dr. John Green	St. Louis, Mo.
Dr. Emil Gruening	New York, N. Y.
Dr. A. D. Hall	Philadelphia, Pa.

DR. GEORGE C. HARLAN.....Philadelphia, Pa.
DR. GUSTAVUS HAY.....Boston, Mass.
DR. ALBERT G. HEYL.....Philadelphia, Pa.
DR. EDWARD L. HOLMES.....Chicago, Ill.
DR. LUCIEN HOWE.....Buffalo, N. Y.
DR. EDWIN HUTCHINSON.....Utica, N. Y.
DR. B. JOY JEFFRIES.....Boston, Mass.
DR. SAMUEL J. JONES.....Chicago, Ill.
DR. CHARLES J. KIPP.....Newark, N. J.
DR. H. KNAPP.....New York, N. Y.
DR. W. S. LITTLE.....Philadelphia, Pa.
DR. EDWARD G. LORING.....New York, N. Y.
DR. F. B. LORING.....Washington, D. C.
DR. W. V. MARMION.....Washington, D. C.
DR. ARTHUR MATHEWSON.....Brooklyn, N. Y.
DR. S. F. MCFARLAND.....Oxford, Chenango Co., N. Y.
DR. R. J. MCKAY.....Wilmington, Del.
DR. C. S. MERRILL.....Albany, N. Y.
DR. H. G. MILLER.....Providence, R. I.
DR. T. G. MORTON.....Philadelphia, Pa.
DR. RUSSELL MURDOCH.....Baltimore, Md.
DR. WILLIAM F. NORRIS.....Philadelphia, Pa.
DR. HENRY D. NOYES.....New York, N. Y.
DR. J. F. NOYES.....Detroit, Mich.
DR. CHARLES I. PARDEE.....New York, N. Y.
DR. A. PER LEE PEASE.....Massillon, O.
DR. O. D. POMEROY.....New York, N. Y.
DR. THOMAS R. POOLEY.....New York, N. Y.
DR. J. S. PROUT.....Brooklyn, N. Y.
DR. WM. RANKIN.....Newark, N. J.
DR. CHARLES E. RIDER.....Rochester, N. Y.
DR. SAMUEL D. RISLEY.....Philadelphia, Pa.
DR. D. B. ST. JOHN ROOSA.....New York, N. Y.
DR. JNO. D. RUSHMORE.....Brooklyn, N. Y.
DR. ROBERT SATTLER.....Cincinnati, O.
DR. H. [illegible].....Philadelphia, Pa.
DR. W. W. SEELY.....Cincinnati, O.
DR. HENRY L. SHAW.....Boston, Mass.

DR. FRANCIS SIMROCK.....New York, N. Y.
DR. A. G. SINCLAIR.....Detroit, Mich.
DR. J. A. SPALDING.....Portland, Me.
DR. FRANCIS P. SPRAGUE.....Boston, Mass.
DR. GEORGE T. STEVENS.....Albany, N. Y.
DR. SAMUEL B. ST. JOHN.....Hartford, Conn.
DR. GEORGE STRAWBRIDGE.....Philadelphia, Pa.
DR. SAMUEL THEOBALD.....Baltimore, Md.
DR. WILLIAM THOMSON.....Philadelphia, Pa.
DR. J. J. B. VERMYNE.....New Bedford, Mass.
DR. O. F. WADSWORTH.....Boston, Mass.
DR. DAVID WEBSTER.....New York, N. Y.
DR. ROBERT WILLARD.....Boston, Mass.
DR. CHARLES H. WILLIAMS.....Boston, Mass.
DR. E. WILLIAMS.....Cincinnati, O.
DR. HENRY W. WILLIAMS.....Boston, Mass.

Total.....77

HONORARY MEMBERS.

DR. G. A. BETHUNE.....Boston, Mass.
DR. R. W. HOOPER.....Boston, Mass.
DR. E. REYNOLDS.....Boston, Mass.
DR. C. SCHWEIGGER.....Berlin, Prussia.

Total.....4
Whole number.....81

MINUTES OF THE PROCEEDINGS.

SIXTEENTH ANNUAL MEETING.

Held in the City of Newport, July 22 and 23, 1880, at the Masonic Building, corner of Church and School Streets.

NEWPORT, *July* 22, 1880.

THE Society was called to order at 10 A.M., by the President, DR. HENRY D. NOYES, of New York.

After an address of welcome by the President, in which he suggested several fertile fields for ophthalmological observation and research, the following committees were appointed. The reading of the minutes of the previous session were rendered unnecessary by their having been printed and circulated among the members of the Society.

COMMITTEE ON MEMBERSHIP.

DRS. HASKET DERBY, of Boston, CHARLES S. BULL, of New York, W. H. CARMALT, of New Haven, JOHN GREEN, of St. Louis, and GEORGE C. HARLAN, of Philadelphia, were appointed Committee on Membership.

COMMITTEE ON BULLETIN.

DRS. DAVID WEBSTER, of New York, and CHARLES J. KIPP, of Newark, N. J., were appointed Committee on Bulletin.

AUDITING COMMITTEE.

DRS. ARTHUR MATHEWSON, of Brooklyn, and F. B. LORING, of Washington, D. C., were appointed Committee on Auditing Treasurer's report.

225 Sam

The Treasurer, DR. RICHARD H. DERBY, of New York, read his report, which was examined and approved by the Auditing Committee.

Upon motion of the Secretary, it was voted that no assessment be levied for the present year.

The reading of the reports of the Committees on Membership and on the Election of New Members was postponed.

The report of the Committee on Bulletin was received, and the order of papers was then taken up.

1. The first paper was by Dr. David Webster, of New York, upon "Sympathetic Inflammation following Operations for Cataract."

INVITED GUESTS.

After the reading of the above paper, and before its discussion was taken up, the President read the names of the following invited guests: Dr. F. C. Hotz, of Chicago, invited by Dr. Knapp; Dr. S. D. Risley, of Philadelphia, invited by Dr. Norris; Dr. E. E. Holt, of Portland, invited by Dr. Prout; Dr. J. C. Peters, of New York, invited by Dr. Derby; Dr. S. B. St. John, of Hartford, invited by Dr. Carmalt; Dr. W. R. Birdsall, of New York, invited by Dr. Prout; Dr. J. A. Andrews, of Staten Island, invited by Dr. Webster.

The order of the Bulletin was now resumed.

2. "A Contribution to the Pathology and Treatment of Vascular Tumors of the Eyelids." By Dr. C. S. Bull.

3. "Peculiar Anatomical Development of one of the Central Arteries of the Retina." By Dr. F. B. Loring.

4. "A Case of Ectropion treated successfully by Wolfe's Method—the Transplanted Piece of Skin measuring 3 × 1½." By Dr. A. Mathewson, Brooklyn.

5. "The Treatment of Ectropion by Transplantation of Skin." By Dr. Lucien Howe, Buffalo, N. Y.

6. "Intra-ocular Lipæmia." By Dr. Albert G. Heyl, Philadelphia.

Upon motion, the Society adjourned in order to go into Executive Session.

The Society was called to order, and the Chairman of the Committee on Membership proposed the following gentlemen as members of the Society: Drs. Samuel D. Risley, of Philadelphia; Samuel B. St. John, of Hartford; S. Theobald, of Baltimore; Henry S. Schell, of Philadelphia, and Robert Sattler, of Cincinnati. These gentlemen were duly elected.

The Chairman of the Committee, Dr. Henry W. Williams, further reported the advisability of the following two changes in the By-laws: in section 3, second line, to substitute for "Thursday," "Wednesday," and the striking out of the sixth section. The subject of the amendment of the By-laws was laid over until the next session of this meeting.

Upon motion the Society adjourned its Executive Session.

7. "A Tabular Report of Two Hundred and Twenty-five Cases of Refraction." By Dr. W. S. Little, Philadelphia.

8. "Report of a Case of Traumatic Paralysis of the Superior Oblique Muscle, with Treatment." By Dr. W. S. Little, Philadelphia.

9. "Report of a Case of Partial Paralysis of the Inferior Oblique Muscle, with Treatment." By Dr. W. S. Little, Philadelphia.

Dr. William F. Norris, of Philadelphia, was requested to take the chair while Dr. Henry D. Noyes, of New York, read his paper upon

10. "Laceration of the Eyelids."

This paper was followed by another by the same author, on

11. "A Case of Double Glioma, with Autopsy."

12. "On Keratitis from Malarial Fever." By Dr. C. J. Kipp, Newark, N. J.

13. "Enucleation of the Eyeball" (by title). By Dr. C. R. Agnew, New York.

14. "A Modification of Loring's Ophthalmoscope." By Dr. H. D. Noyes, New York.

Upon motion the Society went into Executive Session, and the Chairman of the Committee on Membership read the following names proposed for membership:

Dr. S. C. Ayres, of Cincinnati, O., proposed by Drs. E. Williams and C. R. Agnew.

Dr. W. F. Mittendorf, of New York, N. Y., proposed by Drs. R. H. Derby and H. D. Noyes.

Dr. J. P. Worrell, of Terre Haute, Ind., proposed by Drs. Wm. F. Norris and S. D. Risley.

Dr. R. A. Reeve, of Toronto, Canada, proposed by Drs. C. R. Agnew and D. Webster.

Dr. F. C. Hotz, of Chicago, Ill., proposed by Drs. E. L. Holmes and H. Knapp.

The Chairman of the Committee also offered the following amendment to the Constitution to insert in article three, fourth line, after the word "attach," the words "or suffer to be attached."

The Society adjourned until 7.30 P.M.

First Day—Evening Session.

The meeting was called to order by the President, Dr. Noyes, at 7.45 P.M.

The Secretary read the minutes of the preceding meeting, which were declared approved by the Chair.

Dr. Jeffries demonstrated the method of testing color-blindness by means of Prof. Donder's apparatus.

15. "A Case of One-sided Complete Blindness from Ischæmia Retinæ ending in Perfect Recovery." By Dr. H. Knapp, New York.

16. "Eight Sclerotomies for Glaucoma." By Dr. H. Knapp, New York.

Upon motion of Dr. H. W. Williams, the Society went into Executive Session.

Dr. Williams then moved the amendment offered by the committee, that "Wednesday" be substituted for "Thursday" in By-law Third, and that By-law Sixth be expunged. Carried.

Dr. H. Derby, Chairman of the Committee on Member-

ship, proposed that the phrase "or suffer to be attached" be inserted in the fourth line after the word "attach," in Article 3 of the Constitution. Upon motion, this was carried.

OPEN SESSION.

The Chairman declared the Executive Session adjourned, and directed that the Society proceed to the consideration of the Bulletin.

17. "Note on a Case of Unusual Acuteness of Vision, with Circles of Diffusion." By Dr. G. C. Harlan, Philadelphia.

Adjourned.

SECOND DAY—JULY 23, 1880—MORNING SESSION.

The Society was called to order at 10 A.M. by the President, DR. NOYES.

The Secretary read the minutes of the previous session, which were approved.

The Secretary announced the receipt of a card from Louisville, Ky., informing him of the death of Dr. C. S. Fenner.

Upon motion of Dr. Agnew, the Secretary was directed to record the death of Dr. Fenner in the minutes of the Society.

Upon motion of Dr. H. Derby, it was ordered that a new copy of the By-laws be printed and sent to each member of the Society, and with the same a notice directing the attention of the members to the amendments to the Constitution made yesterday.

The Bulletin was now taken up, and the first paper which was read was that of Dr. E. Williams, of Cincinnati, Ohio, on

18. "Report of Two Cases of Cyst of the Iris, with Preparations."

19. "Three Cases of Persistent Pupillary Membrane." By Dr. C. R. Agnew, New York.

20. "The Insufficiency of the Ophthalmoscope as the Sole Test of Errors of Refraction." By Dr. C. R. Agnew, New York.

21. "Neuritis after Measles." By Dr. O. F. Wadsworth, Boston.

22. "Weber's Curved Canaliculus Knife in the Enucleation of the Eyeball." By Dr. J. Green, St. Louis.

23. "A Case of Detached Retina Treated by Hypodermic Injections of Muriate of Pilocarpin." By Dr. J. Green, St. Louis.

24. "A Case of Extreme Exophthalmus in an Infant—Recovery." By Dr. J. Green, St. Louis.

25. "Dr. Theobald's Eye-Bandage." Shown by Dr. H. D. Noyes.

26. "Exhibition of a Combination Set of Trial-Glasses, and a New Trial-Frame." By Dr. J. Green, St. Louis.

27. "Dr. Loring's Keratometer." Exhibited by Dr. O. F. Wadsworth, Boston.

28. "Photographs of Sections through the Fovea." By Dr. O. F. Wadsworth, Boston.

29. Dr. B. Joy Jeffries gave verbally a detailed statement of what has already been done by the United States Government and private corporations for the control of color-blindness and visual defects on land and sea. Connecticut is the first and only State which has established required examination of railroad employees. The various methods adopted by the Connecticut State Board of Health, who have the matter in hand, for testing color-blindness, and to be employed by the medical experts appointed, Dr. Jeffries showed and described in detail. He spoke of the uselessness of attempting to have tests carried out by the laity or by medical men who have not been specially instructed, or specially studied the normal color-sense and practically familiarized themselves with the laws of color-blindness. He cited examples of the unfortunate effect of such attempts, both for the cause of control he has advocated and the rights of the individual, as also for the standing of our specialty among the profession and laity. He explained the purposes and value of and the congressional action taken in regard to the proposed International Commission to determine standard methods of testing color-blindness, and standards of requirement of the chromatic sense and visual power. He asked for a recommendatory vote of the Society in favor of this commission and of the standard of required color-sense and visual acuteness re-

quired by the Connecticut State Board of Health among railroad employees.

30. "An Instrument for the Detection of Color-Blindness." By Dr. Wm. Thomson, Philadelphia.

Upon motion, the Society went into Executive Session.

Dr. Green asked that his paper on "Entropion," offered last year, be published in the present Transactions. This was granted.

The Nominating Committee offered the following names of officers for the ensuing year:

President—DR. H. D. NOYES, New York.

Vice-President—DR. WM. F. NORRIS, Philadelphia, Pa.

Recording Secretary and Treasurer—Dr. R. H. Derby, New York.

Corresponding Secretary—DR. J. S. PROUT, Brooklyn, N. Y.

Publishing Committee—DRS. E. G. LORING and D. B. St. JOHN ROOSA, of New York.

The report of the Nominating Committee was adopted, and the above-named gentlemen duly elected.

The President requested Dr. Carmalt to take the chair.

The Committee on Membership recommended Newport as the place for the next annual meeting.

Dr. Noyes suggested that many members of the Society felt that it would be an advantage to hold the meeting once in a number of years in the west.

After some discussion, the attention of the Society was now directed to the consideration of the report of the committee, and upon motion, it was decided that Newport should be the place for the next meeting.

Dr. Jeffries offered the following resolutions:

Voted, That the Society approve of the regulation of the State Board of Health of Connecticut, in reference to the standard requirements of visual power and color-blindness.

Voted, The Society would hereby heartily approve of the proposed International Commission in reference to visual acuteness and color-

blindness, and the Secretary of the Society is hereby directed to transmit this vote to the Naval Committee of Congress. Carried.

Upon motion of Dr. Webster, Dr. M. Josiah Roberts was given permission to furnish an abstract of the proceedings of the sixteenth annual meeting of the Society for publication in the *Medical Record.*

Dr. H. W. Williams moved that the following two names be offered to the Committee on Membership for nomination.

Dr. J. A. Andrews, of Stapleton, S. I., by Drs. Agnew and Webster.

Dr. H. W. Bradford, of Boston, Mass., by Drs. H. Derby and Dennett. Carried.

The Society adjourned its Executive Session.

OPEN SESSION.

The Society was called to order by the President, and the Bulletin was again taken up.

31. Dr. Russell Murdoch's paper: "(*a*) Combined Forceps, Cystotome, and Curette; (*b*) A Slight Improvement in the Speculum; (*c*) A Slight Improvement in the Ophthalmostat; (*d*) Their Combined Use in Modified Linear Extraction," was read by title.

Dr. Murdoch's paper, entitled

32. "Contribution in Comparative Vision: Eye of Eagle, Buzzard, Owl, Singing-Birds, and Ox," was read by title.

Dr. Charles E. Rider's paper,

33. "Notes on Cataract Extractions," was read by title.

34. Dr. Prout exhibited to the Society, Drs. H. & A. M. Knapp's (Providence, R. I.) dry cup apparatus as a substitute for Heurteloup's artificial leech. It was much cheaper than the latter and answered the purpose very well.

A new scarificator was also exhibited.

The Chairman announced that Dr. Prout's communication would be referred to the Publication Committee.

35. "A Modification of Loring's Ophthalmoscope," with woodcuts. By Dr. H. D. Noyes, New York.

36. "An Improvement in Concave Spectacle Glasses of High Powers." By Dr. J. Green, St. Louis.

37. "An Acute Glaucomatous Invasion following closely upon a Single Application of a very weak Preparation of Duboisia." By Dr. J. Green, St. Louis.

38. "An Improved Operation for a New Pupil after Cataract Operations" (read by title). By Dr. E. G. Loring, New York.

39. "A Modified Operation for Discission in Soft Cataract." By Dr. J. Green, St. Louis.

40. "Case of Nucleus-like Bodies in the Lenses of a Child, Escaping after Discission." By Dr. J. Green, St. Louis.

41. "Mental Government of After-Images." By Dr. B. Joy Jeffries, Boston, Mass.

42. "Optico-ciliary Neurotomy." By Dr. H. W. Williams, Boston, Mass.

43. "Case of Buphthalmus, with Central Anterior Synechia, Cured by Total Removal of the Iris." By Dr. H. D. Noyes, New York.

44. "Dermoid Cyst of Left Cornea." By Dr. S. D. Risley, Philadelphia, Pa.

45. "An Operation for Entropion." By Dr. J. Green, St. Louis.

46. Partial Tenotomy of Superior Rectus. By Dr. Richard H. Derby, New York (by title).

Upon motion of Dr. John Green, it was ordered that the papers read before the Society, or read by title, be referred to the Committee on Publication.

Dr. Green further moved that all papers and other communications intended for publication be placed in the hands of the Secretary before September 15, 1880, and that proofs of the same be sent to the several writers with the understanding that they be returned within one week after their receipt. In case of non-compliance with this order any paper may be omitted from the published Transactions at the discretion of the Publishing Committee. Carried.

The Secretary read the minutes of the last session, which were approved.

Upon motion of Dr. H. W. Williams, the Society adjourned.

RICHARD H. DERBY, *Secretary.*

The following members were present at the meeting of July, 1880:

Dr. C. R. Agnew.....New York, N. Y.
Dr. C. S. Bull.....New York, N. Y.
Dr. F. Buller.....Montreal, Can.
Dr. W. H. Carmalt.....New Haven, Conn.
Dr. Hasket Derby.....Boston, Mass.
Dr. Richard H. Derby .....New York, N. Y.
Dr. John Green.....St. Louis, Mo.
Dr. George C. Harlan.....Philadelphia, Pa.
Dr. Albert G. Heyl.....Philadelphia, Pa.
Dr. Lucien Howe ....Buffalo, N. Y.
Dr. B. Joy Jeffries.....Boston, Mass.
Dr. Charles J. Kipp.....Newark, N. J.
Dr. H. Knapp..... .....New York, N. Y.
Dr. W. S. Little.....Philadelphia, Pa.
Dr. F. B. Loring.....Washington, D. C.
Dr. Arthur Mathewson.....Brooklyn, N. Y.
Dr. Wm. F. Norris .....Philadelphia, Pa.
Dr. H. D. Noyes .....New York, N. Y.
Dr. O. D. Pomeroy.....New York, N. Y.
Dr. J. S. Prout.....Brooklyn, N. Y.
Dr. S. D. Risley.....Philadelphia, Pa.
Dr. S. B. St. John .....Hartford, Conn.
Dr. J. J. B. Vermyne.... .....New Bedford, Mass.
Dr. O. F. Wadsworth.....Boston, Mass.
Dr. D. Webster.....New York, N. Y.
Dr. C. H. Williams.....Boston, Mass.
Dr. E. Williams.....Cincinnati, O.
Dr. H. W. Williams.....Boston, Mass.

SYMPATHETIC INFLAMMATION FOLLOWING OPERATIONS FOR CATARACT, WITH REPORTS OF CASES.

By DR. DAVID WEBSTER,

NEW YORK.

Although cases of sympathetic inflammation of the fellow eye consequent upon operations for cataract are, fortunately, very rare, yet I think it probable that such cases occur more frequently than an examination of current ophthalmic literature would lead us to suspect. We are not reluctant to publish our successful cases, or even our partial successes, but none of us rush eagerly into print with cases in which we have encountered the terrible result of total loss of vision of both eyes by sympathetic inflammation. Still, it is necessary that the possibility of such a result should be known, at least to the profession, and in counselling our patients with regard to the advisability of an operation for cataract, it should always be borne in mind. The possibility of such a result is the strongest argument that can be adduced against operating upon one eye while there is yet useful vision in the fellow eye.

Three cases have come under my own observation in which the vision of both eyes was totally lost, and several others in which sympathetic inflammation of various kinds occurred, but was successfully combated by treatment. One of the first mentioned occurred in the Brooklyn Eye and Ear Hospital when I was house surgeon there.

Case I.—The patient, a woman aged sixty-seven, was operated upon by Von Graefe's method, downward, by Dr. C. R. Agnew. A severe irido-cyclitis set in soon after the operation. Atropine, leeches to the temple, and hot applications were judiciously used, but failed to arrest the inflammation, and within three weeks a painful sympathetic irido-choroiditis attacked the fellow eye. The eye operated upon had by this time lost perception of light, and was enucleated, but the patient refused an iridectomy upon the other eye, and after a tedious and painful inflammation atrophy of the

eyeball resulted. This case was reported by Dr. Agnew in the TRANSACTIONS OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY for 1874, page 265.

CASE II.—This patient was also a woman, about sixty years of age, who had had a cataract extracted from one eye by v. Graefe's method, upward, by a well-known ophthalmologist of another State, and who presented herself at Dr. Agnew's clinic at the Manhattan Eye and Ear Hospital, with sympathetic irido-choroiditis some months later. The eye operated upon being sightless, and having undergone atrophy, was enucleated, and an iridectomy was done on the fellow eye. But these measures failed to arrest the disease, and atrophy of the eyeball was the final result.

CASE III.—This patient was a farmer, aged sixty-nine, who had a cataract extracted from one eye by v. Graefe's method, upward, by a competent eye-surgeon of this city in the spring of 1873, while the fellow eye, though the seat of incipient cataract, still retained useful vision. The eye "went badly," and, within a few weeks, set up sympathetic inflammation in the "good eye." The left eye, that from which the cataract had been extracted, was promptly enucleated, atropine was applied to the right eye, and the patient was treated by mercurial inunction, followed by large and increasing doses of iodide of potassium. After some weeks of treatment the patient was sent home to the country with his eye in a "tolerably quiet condition." His surgeon, leaving the city for a couple of months, instructed him to place himself under Dr. Agnew's care in case of relapse. The patient came to town about the first of August, the eye being painful and the vision being reduced to counting fingers at ten feet. He was treated by leeching, atropine, mercurial inunction, and iodide of potassium, as before, but the inflammation was not checked. Dr. Agnew first saw him on the afternoon of August 6th. He found the eye painful, the tension increased, and the iris pressed forward, nearly obliterating the anterior chamber. Dr. Agnew, who was about to leave the city for a few weeks, left the patient in my care, advising an iridectomy in case the eye did not improve under the treatment that was being pursued. On August 8th, the tension was much increased, the eyeball red, the cornea hazy, the vision reduced to counting fingers at six inches, and the eye very painful. With the assistance of Dr. O. D. Pomeroy, I attempted to do an iridectomy upward. The iris proved to be brittle, and the portion within the grasp of the forceps was torn away without cutting. The anterior chamber becoming

immediately filled with blood, it was thought advisable not to introduce the forceps a second time. The eye was dressed with charpie and a flannel bandage applied. The pain was temporarily relieved by the operation, and the patient rested well, without anodynes, until the night of the 13th—five days after the operation. The tension of the eyeball then again increased, and the patient was obliged to resort to anodynes. On the 15th he returned again to his country home, with only perception of light. On September 11th he returned to the city, having suffered much pain, with hypopyon and loss of perception of light.

The next case that I shall report is one operated upon by myself, in which the result, though sufficiently painful, was not quite so sad as the results of the three preceding cases, the loss of vision of the sympathetically affected eye not being complete.

Case IV.—The patient was a maiden, aged twenty-eight, upon whose left eye I performed a successful cataract extraction by v. Graefe's method, upward, on July 1, 1875. The patient was discharged, cured, eighteen days after the operation, and on the 11th of August following had vision $\frac{20}{50}$ with $+ \frac{1}{31\frac{1}{2}}$, and could read J. No. 1 with $+ \frac{1}{21\frac{1}{2}}$. On October 13, 1875, I extracted the cataract from the right eye by the same method. The eye did well for four days, when inflammation set in, the eye being red, irritable, and watery, and the lids slightly swollen. Iced cloths, atropine, and leeches were used, but the eye went badly, and finally healed with closure of the pupil. On February 21, 1876, I did an iridotomy, in the hope of securing an artificial pupil, but irido-cyclitis again set in, and the eye became atrophied. But this was not the worst of it. A few weeks after the iridotomy, the patient came to me with sympathetic kerato-iritis of the eye which was first operated upon with such good results. The patient left my observation before the inflammatory symptoms disappeared, but up to the time I last heard from her, she retained sufficient vision to enable her to get about alone.

That sympathetic iritis is not always uncontrollable by the ordinary methods of treatment is shown by the following two cases, both of which I watched with great care.

Case V.—Mrs. A. B. H., aged fifty-seven, consulted Dr. Agnew on June 25, 1878. Her general health was very poor. About fifteen months previously she had a slight attack of apoplexy followed by right hemiplegia, from which she has never fully recovered. She is also subject to rheumatic and uterine troubles. Dr. Agnew extracted the cataract from the left eye by v. Graefe's method, up-

ward, on December 18th, a preliminary iridectomy having been done six weeks previously. The bandage was removed and atropine dropped into the eye twice daily until December 25th, when, some reaction setting in, iced cloths were substituted. On the 30th it was noted that the incision presented a grooved appearance, the deeper portion having healed, while the superficial margins, failing to unite, presented a narrow ulcer extending the whole length of the incision. On January 6, 1879, twelve days after the extraction, the patient complained of pain in and about the fellow eye. Upon examination, the eye was found irritable and watery, and there was a considerable degree of deep redness throughout the ciliary region. Atropine was dropped into the eye, and although no adhesions were demonstrated, it was found that the pupil would dilate only a very little. Leeches were applied to the temple, iced cloths were assiduously applied to the eye, and a four-grain solution of sulphate of atropia was dropped into the eye six times in an hour, morning, noon, and night. An ointment of belladonna and mercury was rubbed upon the brow and forehead. The eye began to improve after a few days, and in two or three weeks the pupil became widely dilated and the symptoms of sympathetic inflammation had entirely disappeared.

On February 8th the aphakial eye had vision $\frac{15}{200}$ with $+\frac{1}{3}$, the pupil being obstructed by a membrane, and the fellow eye showed no tendency to a recurrence of sympathetic inflammation.

CASE VI.—Mrs. J. C., aged fifty-nine, had a cataract extracted from the right eye by v. Graefe's method, upward, by Dr. Agnew, on March 30, 1876, the cataract in the left eye being immature, and the eye retaining useful vision.

April 19th.—Has convalesced without pain; membrane in pupil; counts fingers.

April 25th.—As the redness passes away very slowly, applied two leeches to the temple to-day.

April 27th.—Vision $\frac{20}{100}$ with $+\frac{1}{4}$. Entered anterior chamber with Beer's knife, at temporal margin of cornea, and pierced the membrane at the nasal margin of the pupil; introduced a sharp hook and tore away the membrane from its pupillary attachments.

April 28th.—Considerable inflammatory reaction.

May 10th.—A lingering iritis just commencing to get better.

July 15th.—Sympathetic iritis of left eye. Pupil dilates only upward, adherent below. Left, vision, counts fingers at one foot.

Right, vision reduced to perception of light. Pupil drawn up and filled with a thick membrane.

The iritis of the left eye was vigorously combated with atropine, leeches, iced cloths, and anodynes, and within a few weeks we had the satisfaction of seeing the pupil widely and evenly dilated, and the redness had passed away from both eyes.

November 8th.—Iridotomy with a narrow v. Graefe's knife, making a central, horizontal, elliptical pupil. This operation was done without ether, the patient sitting up in a chair. She recovered from this operation without unpleasant reaction, and on December 20th vision was $\frac{20}{100}$, with $+\frac{1}{4}$. The vision remained at $\frac{20}{100}$ at the date of her last visit, May 3, 1877, and when last heard from, some three years later, the fellow eye was quiet, and the vision of the eye operated upon better than at any time since the operation.

The next case I shall relate is one of sympathetic conjunctivitis, an extremely rare form, I believe, of sympathetic inflammation. That it may and does sometimes occur will be admitted, I am sure, by some of my colleagues, for I was present when Dr. Henry D. Noyes presented a case of sympathetic conjunctivitis to the New York Ophthalmological Society, and I think the doctor said, at that time, that he had seen other similar cases.

Case VII.—Mrs. G., aged fifty, had a cataract extracted from her left eye by Dr. Agnew, at the Manhattan Eye and Ear Hospital, on February 16, 1877. The method employed was v. Graefe's, and the cut upward. There was no accident in the operation, but when the bandage was removed the next day it was found that the wound had reopened and some vitreous had escaped. A low grade of iritis set in, without pain or any violent reaction, and on the forty-sixth day an iridectomy was performed downward, in the hope of relieving the irritation caused by the traction of a dense membrane upon the pillars of the coloboma. No pain or chemosis followed this operation, but on April 15th, eleven days after, it was noted that the eye was undergoing rapid atrophy. The right eye, though the subject of incipient cataract, still retained sufficient vision to enable the patient to get about alone. In the spring of 1879, about two years after her discharge from the hospital, she returned with a severe catarrhal conjunctivitis in both eyes. The palpebral conjunctiva was reddened and thickened, and there was a copious mucous discharge. The eyes were lachrymose, irritable, and sen-

sitive to light. This conjunctivitis was treated with various astringents for about two months without apparent benefit, and finally it was decided to enucleate the sensitive, shrunken eyeball. The eye was accordingly enucleated, and the next day there was marked improvement in the conjunctivitis of the fellow eye, and the improvement progressed rapidly, without other treatment than occasional bathing, until within a few weeks the disease had disappeared. The opacity of the lens has not increased, and the patient is still able to make her way about alone.

The rapid improvement of the fellow eye after enucleation of the atrophied one convinced me of what I had before strongly suspected, namely, that the conjunctivitis was entirely sympathetic in its origin.

My eighth case differs from all other cases that have come within my knowledge, inasmuch as the eye sympathetically inflamed had to be enucleated, while the eye causing the sympathetic trouble retained excellent vision to the end of the patient's days. It will be noticed that the eye recovered from the iritis which followed the cataract extraction, and which left a dense membrane in the pupil, without exciting sympathetic irritation. About twenty weeks after the extraction a secondary operation was performed, by which a portion of the pupillary membrane and a part of the adjacent iris were removed, making a clear pupil. The eye recovered from this operation without unpleasant reaction, and remained quiet, retaining good vision as long as the patient lived. But about five weeks after this secondary operation the patient returned to us with sympathetic irido-cyclitis, which had assumed a glaucomatous character. An iridectomy was done at once, with a view of arresting the disease, if possible, but only temporary relief was afforded, and in a little over two months Dr. Agnew felt obliged to enucleate the eye, which was now stony hard and constantly painful, not only for the relief of the pain, but to avoid sympathetic reaction upon the eye from which the cataract had been removed.

The peculiarities of this case, then, are: 1, the sympathetic inflammation occurred after a *secondary* operation for cataract; 2, the eye exciting the sympathetic inflammation made a good recovery, and was not itself at the time the seat of serious inflammation. It may be objected that the irido-cyclitis was not sympathetic at all, but merely coincident. Such, indeed, may have been the case, and I can only say that no other cause could be assigned, and that both Dr. Agnew and myself were strongly impressed at the time with the

belief that the inflammation in the second eye was the result, direct or indirect, of the operation upon the first.

Case VIII.—May 14, 1874, Mrs. B. E., aged sixty-nine, rheumatic and dyspeptic, has had cataract in her right eye for two and a half years, and the left eye is now so blind that she can no longer make her way about alone. Ether was given and the right eye operated upon by v. Graefe's method, the section being made upward with its middle two-thirds in clear cornea. A slight dialysis of the iris was caused by the point of the knife while carrying it across the anterior chamber. The portion torn away from its ciliary attachment was removed by the iridectomy. The lens being large and the corneal diameter disproportionately small, it was found necessary to enlarge the wound with scissors. There was hemorrhage into the anterior chamber and collapse of the cornea. Sixteen hours after the operation the bandage was removed and iced cloths substituted in the hope of controlling threatened inflammatory reaction.

May 24th.—Has had a painless iritis treated by leeching, atropine, and iced cloths. The pupil is filled with a membrane and is not dilatable.

May 27th.—Cannot count fingers. Sent home with instructions to return for a secondary operation when the redness of the eye has passed away.

September 29th.—The coloboma is contracted and filled with a dense membrane. Pierced the cornea about two lines from its lower margin with a v. Graefe's knife, the point of which was carried along through the anterior chamber until it pierced the membrane in the coloboma. A sharp hook was then passed in, the membrane caught and drawn out with the pupillary border of the iris to which it was attached. Seizing membrane and iris with a pair of iris-forceps it was drawn out still farther and carefully excised. Thirty-six hours after the patient counted fingers readily.

October 3d.—V. $\frac{2}{60}$ with $+\frac{1}{4\frac{1}{2}}$, and reads Jaeger No. 1 with $+\frac{1}{2\frac{1}{4}}$.

November 4th.—Returns to us with irido-cyclitis of the left eye. The tension is much increased. The eye operated upon for cataract is unaffected. The patient was again etherized and a broad iridectomy downward performed upon the left eye. Extreme thinness of the cornea was remarked.

November 5th.—Had pain in the eye and head until midnight; has rested without pain since.

November 9th.—Pain in eye for the last two mornings, but the redness has not increased. Allowed to go home.

November 18th.—Received a letter stating that the redness and pain are subsiding.

February 3, 1875.—Has had more or less pain and redness ever since. The eyeball is hard and there is no perception of light. The vision of the right is $\frac{20}{50}$, and the eye is quiet.

February 5th.—Ether administered and left eye enucleated; no adhesions. The eyeball was placed in Müller's fluid, and was afterward examined by Dr. William Cheatham, now of Louisville, Ky., who reported as follows: "Cornea normal; conjunctiva around cornea inflamed; iris and ciliary body enlarged to double normal size; pavement-epithelium of choroid atrophied; choroid has a few colloid corpuscles in it; hyaloid body has close to retina star-like protoplasmic bodies; retina moderately thickened; optic papilla slightly choked, with central excavation."

For my ninth case I am indebted to my friend, Dr. F. M. Wilson, of Bridgeport, Conn., in whose practice the case occurred, and who has kindly furnished me with his notes of it. It is very interesting from the fact that the eye sympathetically inflamed yielded slowly to treatment, and has nearly recovered without so injuring the eye as to preclude all hopes of restoration of sight by an operation.

CASE IX.—May 7, 1877.—Mrs. H., aged seventy-three, fat and flabby. A habitual taker of opium. Diffuse gray opacity of both lenses. Counts fingers at twelve feet with either eye. First noticed failure of vision last July. Vision always good up to that time. Has worn glasses for near work for fifteen years.

December 3, 1879.—Vision reduced to perception of light in both eyes; fields normal. Under ether did preliminary iridectomy, of medium width, upon right eye, upward. Little or no reaction from the operation. Recovery in two weeks. No synechiæ. Atropine (4 gr. sol.) used persistently, but pupil never fully dilated.

January 20, 1880.—v. Graefe's modified linear extraction. Cornea thin and much wrinkled into vertical folds by the traction of the knife. Vertical incision of the capsule with v. Graefe's cystotome. Lens easily removed. Cornea collapsed after it. Some cortical substance left behind. After refilling of anterior chamber, some of this removed by milking. Atropine and bandage.

January 22d.—Bandage removed for the first time. Pupil not clear, but no reaction, or almost none, from the operation.

February 1st.—At the daily dressings have noticed but little change

until to-day. To-day the ciliary injection is more marked, and the patient complains of pain for the first time. Hot water for ten minutes stops the pain. Stopped bandaging and put on shade.

February 4th.—Ciliary injection and discoloration of iris have steadily increased. Pain at intervals, but always relieved by hot water.

February 10th.—Since the 6th the ciliary injection has decreased, and the patient has had less pain. Pupil clearing. Says "she sees my face." Counts fingers at one foot. Pupil yielding to atropine.

February 20th.—Gradual improvement since the 10th. Counts fingers at four feet. Has complained for several days past of pain in the bones of the orbit and upper jaw. Had dentist remove a decayed upper molar. During the past month she has taken, in varying doses, ʒ iv. of paregoric, and occasionally morphine at night. Have regulated her bowels with castor-oil and seidlitz powders.

March 1st.—Vision still improving. Counts fingers at fifteen feet. Pain in bones has ceased.

March 11th.—Not much change. Pupil not yet entirely clear. Opening in the anterior capsule triangular, apex upward. She is to return to her home, twenty miles distant, to-morrow.

March 26th.—The eye began to pain the day after reaching home. Hot water and double her regular atropine, *ter in die*, failed to relieve it. She secretly drugged herself with opium for nearly three days. After they took her opium from her the pain in her eye was very severe—"the worst she has had at all."

On the 21st she complained, for the first time, of pain in her *left eye*. On the 25th they sent me word. I found the following:

Right eye: lids swollen, cornea hazy, ciliary region much injected and tender, iris discolored, lymph on its surface, and so contracted that what was formerly the pupil is now entirely covered with iris. The opening formed by the iridectomy is entirely filled with lymph, and the iris is adherent to it.

Left eye: lids not swollen, ciliary region injected and tender, cornea clear, iris discolored, lymph on its surface and floating in pupil. Tension of both eyes increased. Suffering most pain in right.

Bowels to be purged with castor-oil. Inunction treatment to be pushed to slight tenderness of gums. Leeches on right temple. Hot water and atropine *ad lib.* to both. The first application of leeches (three) was followed by cessation of pain. The left pupil responded slightly to the atropine while I was there. The right was evidently adherent along its whole edge.

April 6th.—Under above treatment there has been gradual cessation of active symptoms. The right iris is commencing to wrinkle into perpendicular folds. Has had no pain in the right eye for a week. The left still has ciliary injection and tenderness, lymph in iris and in pupil, though the lymph in the pupil has never been more than a slight cloud. She still has good perception of light in both eyes. *No synechiæ in the left.*

June 4th.—Have seen her about once a week to date. *Right*, with its "drawn up" pupil, perfectly quiet. *Left* nearly well. Good perception of light in both.

My friend, Dr. Oren D. Pomeroy, has kindly contributed the following two cases to my paper:

CASE X.—Matthew A., native of Ireland, aged sixty-four. On January 11, 1877, extracted lens from right eye; fully mature. Could see to get about with left, which was cataractous. Section of cornea performed without accident, except that the termination of the incision was rather abrupt, owing to the fact that there was an excessive arcus senilis corneæ, which apparently rendered the tissue rather brittle. On the least effort being made to remove the lens, vitreous escaped; but ultimately the lens was removed with moderate loss of vitreous, without introducing instruments into the eye. There was very moderate inflammatory reaction, no pain at all, and he did very well for a month. There was a good degree of sight. After this there was considerable iritis, which resulted in a partially closed pupil, the iris dragging far to one side. After seven weeks an iridotomy was performed, which resulted in some reaction, terminating in a slight decrease of the normal tension of the eyeball. Two months after this another operation was done by a needle on the membrane in the pupil. Considerable reaction followed this, and I suspected that phthisis might result while this operation was being recovered from. Some conjunctivitis was present in the fellow-eye, but without photophobia. I did not feel certain whether it was sympathetic or not. The patient then suddenly stopped coming to the hospital, and I lost sight of him until June 11, 1880, when he returned for relief papers to be made out in consequence of being blind. Right eyeball much atrophied, pupil closed, and no perception of light. Left eye has a closed pupil, eyeball of normal tension, field obliterated in infero temporal quadrant. I did not encourage him to have an operation performed on this eye. He stated that

there never had been pain in this eye. I inferred that this was a fair case of sympathetic ophthalmia, due to the operation of extraction performed on the right eye.

Case XI.—Mrs. M., born in Ireland, aged sixty. Senile cataract in both eyes; mature in right; left counts fingers at eight feet. On March 1, 1877, extracted lens of right eye without accident. Considerable inflammatory reaction resulted, although she could see very well for several weeks. Iritis, however, persisted, and recurred from time to time, so that in two months the pupil was completely closed, the iris evidently being considerably put upon the stretch. The fellow eye became somewhat irritable, but not reddened, and an iridotomy was done on the operated eye, the incision being carried through two-thirds of the iris in a vertical direction, so that the fibres were very well divided. The patient sat upright in a chair, and was not etherized; by this means the blood collected in the lower part of the chamber, so the incision was only partly covered with blood. In one week she counted fingers at ten feet, and afterward further improvement resulted. The left eye was quieted by the operation. The inflammatory reaction was almost *nil*. In three or four weeks the left eye again became irritable, and notwithstanding treatment developed into a kerato-iritis, with closure of the pupil. Intense ciliary injection accompanied the process, and there was considerable pain and photophobia. The right eye was perfectly quiet from the time of the iridotomy. I felt an embarrassment, which others have also observed, in knowing how to meet this new indication. The first eye already being a moderately good one, although the tension was a little diminished, I did not feel like sacrificing it, thinking that the chances of procuring as good a visual result in the left were somewhat remote, whatever procedure were adopted. After the inflammation of the left had gone on quite painfully for three weeks, I extracted the lens through a very large iridectomy. The symptoms were at once ameliorated, and after two weeks bid fair to result in a good recovery, when she suddenly contracted a pleuro-pneumonia, and died after one week of illness.

The results of these *eleven* cases sum up as follows:

In *four* cases both eyes were lost.

In *one* case the eye causing the sympathetic inflammation was lost, and the sympathetically inflamed eye was badly damaged.

In *one* case the eye causing the sympathetic inflammation was lost, and the sympathetically inflamed eye recovered in good condition.

In *one* case the eye causing the sympathetic inflammation recovered with a "drawn-up" pupil and perception of light, while the sympathetically inflamed eye recovered with only slight damage.

In *one* case the eye causing the sympathetic inflammation retained useful sight, and the sympathetically inflamed eye was afterward operated upon, and gave promise of a good recovery, when the patient died, and thus prevented a knowledge of what the ultimate result would have been.

In *two* cases both eyes recovered in good condition.

In *one* case the eye sympathetically inflamed was lost, while the eye causing the sympathetic inflammation retained good vision as long as the patient lived.

REMARKS.

DR. MATHEWSON remarked that he should never forget the first case of sympathetic inflammation he saw. The operation for cataract was successful and everything passed off very nicely for five or six weeks. The patient, a lady fifty-five years of age, was operated upon after v. Graefe's method, by his friend Dr. Newton, a former member of this society. Four weeks after the operation her vision was $\frac{20}{20}$. Shortly after that, from some unknown cause, the eye became the subject of irido-choroiditis, which resulted in its loss. The other eye became affected, and sight was diminished to the faint perception of light. He had seen four or five other instances of sympathetic inflammation, not, however, in his own practice. He had not been tempted to operate upon a cataractous eye so long as its fellow retained vision.

DR. HASKET DERBY, of Boston, inquired of the author of the paper for the percentage of cases in which sympathetic inflammation occurred.

DR. WEBSTER remarked that it was impossible to tell in what proportion of cases it occurred.

DR. DERBY thought that its occurrence was very rare, for in two hundred and eighty-seven cases of v. Graefe's operation he had seen no instance of sympathetic inflammation.

DR. E. WILLIAMS, of Cincinnati, O., remarked that it had occurred to him only once in his practice to have a patient lose both eyes after operation for cataract, although he had seen several other instances of this at a late period, where he was not able to judge of the original condition of the sympathetically affected eye. In the case referred to the patient was a man of sixty-eight years, feeble in health, of a malarial disposition, and with a tendency to cardiac failure. His eyes were deeply set, of small size, and hypermetropic. He came complaining of both eyes, and an extraction downward was done after the usual modification of v. Graefe's method. On account of the small size of the cornea considerable difficulty was experienced in the removal of the small, hard lens. For a few days

the case progressed favorably; then little by little an insidious hemorrhagic iritis set in, and the eye operated on was lost. The patient was kept under observation for two or three weeks longer and then allowed to go home, no sympathetic inflammation having occurred. Some weeks later, however, a letter was received from the doctor who had the case in charge, stating that the patient was suffering from pain in the other eye. Dr. Williams directed that the patient be sent at once to him, but the direction was not complied with. Some months afterward the patient was brought to him with both eyes absolutely blind and very sensitive. Although the patient came to have his second eye operated upon for cataract, Dr. Williams declined. In many hundred operations this accident had only occurred to him once, so that he thought the percentage of cases in which it occurred must be very small indeed. He had made it a rule for many years to refuse to operate upon one eye of a cataractous patient so long as useful sight of the other remained. He always waited until the cataract had so far progressed in the second eye as to incapacitate the patient for reading, writing, or enjoying life. He thought this rule was certainly a safe one. Particularly had he been careful to refuse to operate upon traumatic cataracts where the other eye was in good condition. He thought these cases were peculiarly liable to sympathetic trouble.

Dr. H. Knapp, of New York, did not think the advice just given should be an absolute rule of conduct. We knew that in cataract of advanced years both eyes would always be affected, and it might be that, when the second eye became useless, the chance for a good result from the operation upon the first eye was much lessened. The longer the cataract existed beyond the period of maturity, the worse the prognosis. Cases of sympathetic ophthalmia after cataract operations were rare. He would, therefore, in a general way formulate the indication for any extraction as follows: "Perform the operation when it offers the greatest chance of success." External circumstances may render it opportune to operate before or after that period; but, if we want to do the greatest good to the greatest number of our patients, this rule will stand criticism. By waiting, for instance, five years until the cataract of the other eye has become blind, the cataract in the first may have become hypermature, degenerated, and complicated. Its removal then was dangerous for both eyes, whereas at the period of maturity the operation would have been easier and a great deal safer.

Dr. Pomeroy remarked that he had been much interested in the paper and the discussion which it had called forth. It seemed that we might have sympathetic ophthalmia without encroaching upon the ciliary region by the corneal incision, and he thought the shrinking of neoplastic growths in the region of the pupil was sufficient to cause sympathetic inflammation. He confessed that he looked with great fear upon neoplastic contractions in the ciliary region after operation for cataract.

Dr. Noyes said that he could contribute two cases to this ques-

tion out of two hundred or two hundred and fifty operations, making a percentage of less than one per cent.

DR. GEORGE C. HARLAN, of Philadelphia, stated that he had seen one case.

DR. WILLIAM THOMSON, of Philadelphia, remarked that he had seen two cases of sympathetic inflammation occurring after operation for cataract, but that he could give no statistics.

DR. C. R. AGNEW, of New York, stated that it was impossible to give accurate statistics on this subject, although his impression was that the cases in which sympathetic inflammation occurred ranged between two and three per cent. of the cases in which the eye operated upon was a total loss. He thought it must have been the experience of all the gentlemen present to have seen cases in their practice where the loss of an eye had followed an operation for cataract by another physician. We also knew that patients ran for long periods after extraction and then lost the eye operated upon, even though, during the interval, the vision had been satisfactory. He had seen cases where this occurred ten or twelve years after extraction, so that there was always that source of error.

A CONTRIBUTION TO THE PATHOLOGY AND TREATMENT OF VASCULAR TUMORS OF THE EYELIDS.

BY DR. CHARLES STEDMAN BULL,

NEW YORK.

ANGIOMATA of the eyelids and vicinity may be both cavernous and teleangiectatic: the latter being the most frequent and almost always congenital, while the former are rarer and are generally not congenital, but make their appearance during childhood or youth. It is certain that, in almost all the cases where the skin is involved, the growth has been congenital or appeared in very early infancy, and the probability is that the same thing is true of the angiomata that are more deeply seated, though from their very nature they are more likely to be overlooked. These tumors have been known to occur late in life and here may be of traumatic origin. When seated entirely beneath the skin, the latter is generally healthy; but when the skin is involved, even though but slightly and in its deepest parts, it becomes livid and often very thin. Most of these tumors, whether cavernous or teleangiectatic, are of a capillary or venous nature, and

only rarely is the blood-supply and the vessels directly arterial. This point of difference between them it is very important to determine, as it has a bearing upon the nature of the operative treatment. The growth of these vascular tumors, whether congenital or not, is very uncertain. They often increase in size *pari passu* with the rest of the body, but perhaps as often remain stationary for a long time, and then suddenly grow very rapidly without any apparent cause. As a rule, the more superficial an angioma is, the more apt it is to be capillary in structure and teleangiectatic, while the deeper growths are generally venous and of a cavernous structure; but there are exceptions to both these rules. The angiomata may here grow to a very large size, which is probably due to the great vascularity of the parts and to the looseness of the mesh-work of the subcutaneous connective and adipose tissue. The larger the tumor, the more likely it is to be venous and cavernous, and the greater the probability of its being encysted; for the more perfectly it is surrounded by connective tissue, and the more closely pressed together are the bands of connective-tissue fibres, the more completely is the tumor encapsulated. This is of importance in deciding upon excision for its removal; for if the growth has a distinct cyst-wall, its dissection is much easier and the chances of hemorrhage are much smaller, although so many vessels perforate this capsule that it is by no means a perfect wall.

These cavernous angiomata on section resemble similar growths elsewhere in the body—the interior meshes of the trabeculæ are generally finer and the spaces not so large as in regions where there is more connective tissue. If the cyst-wall is accidentally opened during its removal, the contents gush out at once and the tumor collapses almost completely, showing the intimate connection between the spaces. The interior aspect of these cavernous angiomata is not however, always the same, for the trabecular appearance is sometimes defective, and even entirely absent. Paget speaks of parts of the vascular structure being consolidated with blood-clots or with partial obliteration of the vessels, and even of complete consolidation by adhesive inflammation.

Another change that sometimes occurs is the transformation of a cavernous angioma into a sanguineous cyst. This probably results from an enlargement and coalescence of the venous channels, this view being confirmed by the mouths of veins having been found opening into the cyst. The contained blood is here venous and liquid, and the cyst-wall generally very thin and not easy of dissec

tion. Of course such a cyst collapses immediately when opened, and when completely divided may prove to be a single cavity, lined by a smooth wall, or there may be some remains of trabeculæ. Angiomata of the lid may be pedunculated, and hang down from a small base, causing ptosis of the upper lid, or eversion of the lower lid, according to their location. They are more apt, however, to have a somewhat broad base, though they may be freely movable beneath the overlying skin, which is not adherent. A somewhat extensive examination of these tumors in various parts of the body have led the writer to the conclusion that these angiomata are almost always venous. Microscopical examinations have shown that the wall of the cyst varies in thickness, but is always composed of a larger or smaller number of layers of connective-tissue fibres, perforated at all points by tortuous veins. The arteries are very few in number, and very small. Sections of the trabecular structure have shown the same appearances of a mass of veins interlacing in connective tissue, some of the vessels being varicose, though generally this did not appear. According to both Virchow and Robin, however, this sacculated appearance is very common. The cyst-wall is sometimes so dense that sections teach very little. The closely matted fibres are difficult of dissection, and the blood-vessels are so firmly embedded in the fibrous tissue as to make their isolation well-nigh impossible. In the blood-spaces between the trabeculæ, inside the tumor, the walls are lined with endothelium—a prolongation of the lining endothelium of the veins. The enormous number of vessels penetrating this capsule make its removal extremely difficult without causing annoying hemorrhage, and hence a lid-clamp should always be employed before attempting excision. The most interesting point in the pathology of these vascular tumors of the lids, and the one least understood, is that disease of the tumor which results in the development of cysts in their substance. Another point intimately connected with this feature of angiomata, and one of which no mention has as yet been made within the knowledge of the writer, is the change of a dermoid cyst into a vascular tumor. A case of the latter kind was observed by the writer; the tumor was removed, and a careful microscopical examination made, and it will be described later.

The history of the changes by which a cavernous angioma becomes in part or wholly a sanguineous cyst, is very incomplete; and this must necessarily be so, for the opportunities of observing them are rare. It is probable, however, that the same process which de-

velops a cavernous angioma, if carried on uninterruptedly, would end in the formation of a sanguineous cyst. The most plausible theory of the development of cavernous tumors is that there arise close to each other a number of circumscribed dilatations of small veins, and that their walls at the points where they touch become gradually thinner, and are finally absorbed, and thus the several cavities coalesce. Now, if this process is carried on continuously, the blood-supply will cease to be conveyed in veins, and will be contained in irregular sinuses or spaces, divided from each other by trabeculæ of connective tissue, which are the remains of the walls of the veins. Eventually, even these trabeculæ will be absorbed by mutual pressure, and a single large cavity will be formed, the walls at first rough from the remains of the absorbed dividing bands, but eventually becoming smooth, and thus a sanguineous cyst is formed. That this is the probable origin of such cysts is supported by the fact that the true cavernous structure and the sanguineous cyst have been found in one and the same tumor. Another point in favor of this mode of origin is that the contained blood is always fluid, while in cysts which have probably been serous the blood contained in them is coagulated as if from a hemorrhage.

The following case of mixed cavernous angioma and sanguineous cyst was under the writer's observation, and was removed by excision, and a microscopical examination showed the mixed nature of the growth :

Case I.—*Cavernous angioma and sanguineous cyst of the upper lid.*—Jane S., aged twenty-eight, presented herself at the New York Eye Infirmary, September 29, 1879. She was an undersized, ill-developed woman, of marked strumous characteristics, looking much older than her actual age, and with her face and neck covered with acne-pustules, some of which were dark red, as if containing blood. There was complete ptosis of the right upper lid, caused by the weight of a large tumor, the size of a hazel-nut, which hung from the junction of the middle and inner thirds of the lid. The tumor was soft and elastic, had a nodular surface, was of a purplish color, and was adherent to the lid by a pedicle, which was about one-third the diameter of the tumor. The skin covering it was adherent, but the tumor was freely movable on its pedicle, and seemed to have no firm connection with the tarsus. The patient stated that there had always been a small red blotch on the lid since birth, which was probably a flat nævus, but that twelve years ago this had begun to in-

crease in size until it reached its present dimensions. It caused no pain, but was a marked inconvenience from the ptosis it occasioned. The patient was told that the tumor could be removed, and that the operation had better be done at once, as it might ulcerate, and give rise to profuse hemorrhage. This she declined to have done, and went away, and did not appear again until two months later, November 28, 1879, when the tumor had increased somewhat in size. The lid could be partially raised by the action of the levator palpebræ muscle, and the orbicularis acted well, and seemed to diminish slightly the size of the tumor, by making it less prominent. The patient now consented to an operation, and she was anæsthetized and a lid-clamp carefully and firmly applied. The base of the tumor or pedicle was about half-way between the eyebrow and ciliary margin of the lid. An incision was made through the skin covering the apex of the tumor and parallel to the lid margin. The skin was very thin, and it was with the greatest difficulty that it could be dissected up without injuring the cyst-wall. By means of blunt-pointed scissors and a strabismus-hook this was, however, done, the adhesions being nowhere firm until the base was reached. Here it was firmly adherent to the deep fascia, and in its growth had pushed the fibres of the orbicular aside. In attempting to detach the base of the cyst its wall was opened, and a large quantity of dark fluid blood poured out, and the tumor immediately collapsed. The cyst was then easily dissected out entire from its bed, and the cavity in the lid carefully washed out and sponged dry. An examination showed that the angioma had been developed in the fibres of the orbicular muscle and the underlying connective tissue; but the tarsus was not involved, for its upper border was only on a line with the pedicle of the tumor. When the clamp was loosened the cavity filled almost immediately with blood, which seemed to come from all sides, showing that the venous channels were very numerous. It was not deemed advisable to use any hæmostatic, so the lid-clamp was reapplied, and kept in position until all oozing had ceased. The lips of the wound were then closed by sutures, and a pressure bandage applied. During the night the hemorrhage recurred beneath the bandage, and on the removal of the dressing the cavity was found filled with clots, and the lid infiltrated and inflamed. During the day a bleb formed on the surface of the lid, and ecchymoses occurred in the lids of the other eye, and in several spots on the face. The cavity was again cleansed, and left open, and moderate cold applied. The hemorrhage did not recur, the bleb subsided, the

ecchymoses were slowly absorbed, and the cavity began to granulate from the bottom, and in three weeks was entirely healed. The whole process was very slow, which may be ascribed to the general unfavorable condition of the patient.

An examination of the cyst showed that the wall was thickest toward the apex of the tumor, and when it was laid completely open, it was seen to be a mixed cavernous angioma and sanguineous cyst. There were some few fibrous bands or trabeculæ remaining, but they were short and imperfect, and the main part of the interior was one large cavity. Microscopical examination of sections of the wall of the sac showed that it consisted of layers of fibro-cellular tissue closely pressed together, perforated on all sides and in all directions by blood-vessels, most of them veins and some quite large. The cyst seemed to have been developed in the substance of the orbicular muscle, for on the outside of the cyst-wall were muscular fibres, some running longitudinally and others seen in cross-section; while most of the fibres of the muscle were at the bottom of the cavity containing the cyst, and had been pushed aside by the growth of the latter. The vessels, especially the veins, were filled with blood-cells, and on the inside of the wall were several large cavities filled with blood-corpuscles, into which numerous vessels, mainly veins, opened. These sinuses no doubt communicated with the large central cavity. At various points in the wall of the cyst there was a cavernous arrangement of the fibres, the spaces existing here being filled with blood-corpuscles. An interesting point in the pathology of these blood-cysts of the lids, and heretofore briefly referred to, is the possible transformation of a dermoid cyst into a blood-cyst. This was not suspected in the case referred to at the time of operation, nor until the microscopic examination showed unexpectedly some of the constituents of a true dermoid cyst. The case is as follows:

Case II.—The patient was a man, aged twenty-three, who said that there had been a small red swelling, as large as a large pea, in the upper lid near the inner canthus, as long as he could remember. It had never occasioned him any inconvenience until within a year, during which period it had grown markedly in size, and caused pain and a sense of weight in the lid. When he presented himself to the writer there was a tumor the size of a large walnut, with a broad pedicle, hanging down from the upper lid, about midway between the ciliary and upper border of the tarsus. The overlying skin was deep red,

almost purple in color, and somewhat movable over it. Contraction of the orbicular muscle made no alteration in its size, but stooping or bending over increased it in size. There was no pulsation or thrill, and it was not especially sensitive on pressure. Its base seemed to be attached to the tarsus. It was determined to remove it by excision, and a lid-clamp was placed in position, and screwed firmly down. An incision was then made horizontally through the skin covering it, and the latter was carefully dissected up on all sides. It was found very thin, and the orbicular fibres had either been pushed aside or were atrophied, as none were perceptible. The cyst-wall was successfully detached until the base was reached, but here the adhesions were firmer, and unfortunately the knife opened into the cyst, and a quantity of very dark and fluid blood escaped. The cyst immediately collapsed. There was but very little oozing of blood, and the tumor was easily dissected out and removed. The cavity was then cleansed and examined for bleeding vessels, but none were found. As soon, however, as the clamp was loosened, the hemorrhage became quite profuse and seemed to come almost entirely from the nasal end. A small carbolized catgut ligature was applied around a bunch of bleeding vessels, all clots were removed from the tissues of the lid, the wound was carefully closed by sutures, and a pressure bandage applied. The wound healed rapidly except at the nasal end, from which a thin discharge exuded for nearly a week. This then closed, and there has been no further trouble. The man has complete control over both the orbicular and levator muscles of the lid, though there is still some ptosis.

The cyst was hardened in Müller's fluid and alcohol, and sections were then cut for examination. A microscopical examination of a number of sections made through different parts of the cyst-wall showed that the tumor had undoubtedly been a dermoid cyst, developed in the deep connective tissue of the lid, and involving the tarsus at the point where the base was most adherent. The wall was composed of numerous layers of connective-tissue fibres, very densely pressed together, but, contrary to what is usually found in dermoid tumors, the wall was perforated by numerous blood-vessels, more or less filled with blood-corpuscles, and opening either into sinuses in the cyst wall or into the main cavity in the interior. Bands of muscular fibres could be traced in part over and in the wall; and at the base, where the wall was thickest, could be seen part of the structure of the tarsus, with remains of the Meibomian glands. The sinuses in the wall were filled with blood-corpuscles,

and some of them were of large size. At one or two points on the interior surface were short hairs projecting into the cavity, their canals being lined with cylindroid epithelium. No trace of any sebaceous contents existed, such as ordinarily is found in dermoid cysts; and the extreme vascularity of the wall was another point of difference. According to the patient's story, the tumor dated from infancy, was probably congenital, and had always been red, and hence the wall was highly vascularized. That the tumor had been from the beginning a blood-cyst is not probable from the microscopical structure of its wall. Why it should have remained quiescent for so many years, and then have suddenly taken on a rapid growth without any known cause, does not admit of an explanation. An injury, such as a blow, might have excited inflammatory action in the tumor; but this would have probably terminated either in suppuration of its contents and ulceration through its walls, or in the formation of a clot from internal hemorrhage from some of the numerous vessels in the wall of the cyst, which in its turn would probably have broken down and disintegrated. The case is of interest from its apparent inexplicability. The deep extension of the growth into the tissue of the tarsus recalls a case of teleangiectasia of both lids of one eye, reported by Schirmer in the *Arch. für Ophthalmologie*, VII., 1, p. 119, in which the vascular enlargement penetrated the conjunctiva, and even extended to the ocular conjunctiva. This case also existed from birth.

A few words in closing in regard to operative procedures. I most unhesitatingly affirm that I prefer excision by the knife to the other methods of treatment for the ordinary vascular tumors met with in the lids. Dr. Knapp, in a very interesting paper in the *Archives of Ophthalmology and Otology*, V., Nos. 3 and 4, pp. 514 to 524, also claims for extirpation advantages over all other methods of treatment. While recognizing the possible dangers from hemorrhage, he shows how the latter can be obviated or controlled. The lid-clamp forceps of Desmarres or Snellen, or Knapp's modification of Desmarres' instrument, should always be used, as the blood-supply is thus entirely cut off, and the operation can thus be made almost bloodless. If the tumor involves the ciliary margin of the lid, its removal may necessitate a subsequent plastic operation to remedy the defect in the lid; but angiomata are not so common in this situation as they are higher up on the lid. Knapp recommends here partial extirpation of the tumor, excising the epitarsal part, and

trusting to shrinking of the deeper parts in the tarsus from loss of its blood-supply through the divided epitarsal vessels. Of course, in the larger angiomata which extend into the orbit, some further steps are necessary, a discussion of which is beyond the limits of this paper. This latter class of tumors is considered in Knapp's paper, before referred to.

REMARKS.

DR. AGNEW remarked that, if he remembered rightly, the doctor, in his narrative, did not describe a case occurring higher than the upper eyelid. He had seen one four weeks previous that occupied the upper half of the eyebrow. He agreed with Dr. Bull that the clamp was necessary in operating for the removal of such growths. In this case, however, he did not use it, and thought that some modification of the forceps would have to be made in order to clamp the tumor in that region. If he were to operate again in that region, he would modify the forceps so as to include the tumor.

DR. KNAPP thought we should remove these tumors as soon as they were brought to our notice. A year ago he had seen an excessively large one, by the kindness of Dr. Frank, of Baltimore. It had been allowed to grow for fifteen months. The eye was pushed toward the nose, and large vascular tumors occupied the corresponding side of the face, being then beyond all treatment. Dr. K. was sure that in its initial stage the tumor might have been easily removed.

PECULIAR ANATOMICAL DEVELOPMENT OF ONE OF THE CENTRAL ARTERIES OF THE RETINA.

BY DR. F. B. LORING,

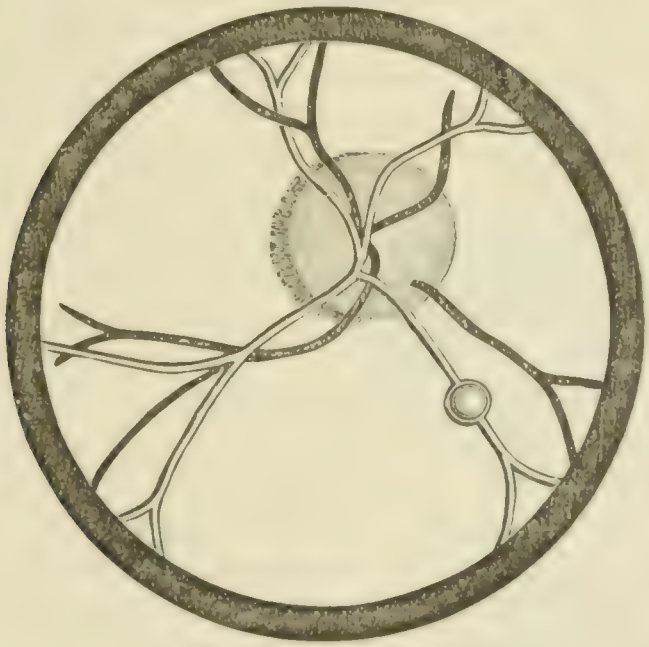
WASHINGTON, D. C.

THE following case is not one that can claim, perhaps, much importance in a clinical point of view, but is one that seems worthy of publication, on account of a peculiar anatomical development of one of the central arteries of the retina.

MR. H. consulted me, some time since, on account of a slight attack of phlyctenular keratitis in the right eye, that yielded most readily to treatment. On his last visit he requested me to make a thorough examination of his eyes, as, being a deaf-mute, he was

most dependent on them, and was anxious to know if an early use of glasses would be of benefit to them.

Both eyes were emmetropic in refraction; $V. = \frac{20}{20}$ —A. good, and the field and color-perception normal. Under the ophthalmoscope the media and lenses were clear and transparent, and the retina and choroid normal in every respect. In the left eye, however, the lower branch of the central artery presented a most peculiar bulging of its entire circumference. This annular enlargement took place below the margin of the papilla, at a distance corresponding to about three-fourths of its diameter, and was situated at about two-thirds of the distance between the lower edge of the disk and the first bifurcation of the artery taking place below it, its central diameter being nearly three times as great as that of the vessel proper. Its color was lighter than that of the artery, and the "light streak" ter-



minated abruptly at its origin, beginning again immediately below it. There was no pulsation attainable by pressure and there was no stasis of the blood-column above it. The fundus was singularly free from blood-vessels in its near neighborhood, thus allowing a most exact examination to be made with ease. The patient was a young and healthy man of twenty-five years, and a careful examination of heart and lungs proved both to be normal. His hearing had been lost in early infancy, from an attack of measles.

The principal points of difference that this case presents to the majority of cases of aneurismal dilatation already reported, are, I

think, chiefly confined to the two following: *First*, that the vision and functional processes of the eye were not affected; and *Second*, that there was no pulsation, either of a spontaneous nature, or to be obtained by pressure.

The first of these is due probably to the fact that the dilatation of the artery took place after the vessel had emerged from the nerve, so that there was no compression of its fibres, as in the pathological preparation now in the possession of Professor Schmidler, of Friburg, in which the aneurisms compressed the optic nerves of both eyes, and in which vision was completely lost, with the exception of a faint perception of light in looking downward (*Dictionnaire des sciences médicales*, tome xxv., p. 20). A similar case is also reported by v. Graefe (*Angiectasie*, p. 32, Leipsig), in which the central artery was dilated to the size of a blade of grass, while yet within the nerve, and in which the blood-vessels of the retina were varicose. In this case the loss of vision was probably due directly to compression, as in the case of Cooper. In the present instance, however, the expansion was considerably below the point of exit from the nerve, and in such a position that the enlargement would produce the least possible amount of harm; and, moreover, it had not progressed to an extent sufficient to impede the flow of blood through it to the tissues below.

In the second place, in regard to the pulsation, Sous reports a case (*Annales d'oculistique*, 1865) of a woman of sixty-four years, in which he found a *red* ovoid tumor on the left optic nerve, extending below its margin, and presenting evident signs of pulsation, the dilatation being synchronous with the systole of the heart.

It is, however, a well-known anatomical fact that aneurisms, even of a considerable size, *do* exist, without pulsation, when the walls have been thickened by deposits of coagulated blood and successive layers of fibrin, and that this process, particularly in the smaller arteries, is often a means of spontaneous cure.

That this conservative process had, to some extent, taken place in Sous' case, seems probable from these facts, viz.: that pulsation did not exist; that the color of the enlargement (unlike that of our case) was lighter than that of the vessel proper, and that there was an entire absence of the illuminated spot, corresponding to the "light streak" of the cylindric vessel, that we should expect to find on the convexity of the dilatation, if the latter were completely filled with blood, with walls possessing the same, or an increased degree of transparency.

A CASE OF ECTROPION TREATED SUCCESSFULLY BY WOLFE'S METHOD, THE TRANSPORTED PIECE OF SKIN MEASURING THREE BY ONE AND ONE-HALF INCHES.

By DR. ARTHUR MATHEWSON,

BROOKLYN, N. Y.

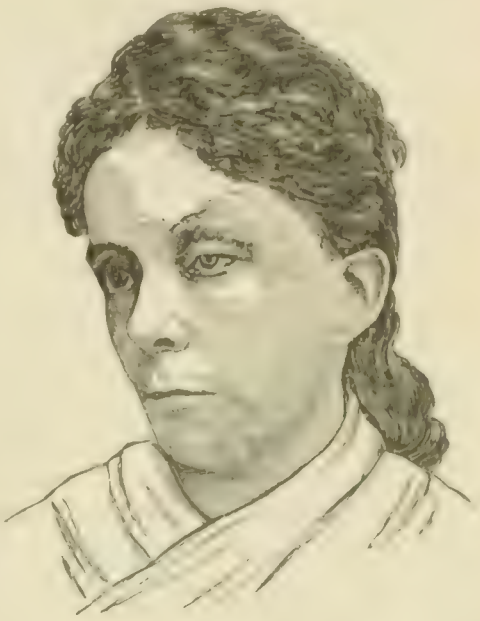
THE following case of skin-transportation for relief of ectropion is presented as an illustration of the value of the method introduced by Wolfe, and as an addition to the record made by Wolfe, Wadsworth, Noyes, Zehender, and Aub, in the eight previously reported cases. It seems specially worthy of note from the size of the transported flap —3″ × 1½″—and the completeness of its union and preservation.

Ella Moulton, aged twenty-one, was burned when a child of five years, the whole left side of the face and forehead being now covered with cicatricial tissue, and the upper eyelid completely everted and its ciliary margin drawn upward on the supra-orbital ridge. The condition of the surrounding tissues being such as to render the success of other methods doubtful, an operation by Wolfe's method was performed at the Brooklyn Eye and Ear Hospital, May 1, 1880. In order to secure as much vascularity of tissue as possible, they had been subjected to a sort of massage for some weeks previously. The everted lid was freed from its adhesions by an incision parallel to and a little above its ciliary margin, and the dissection continued till the edge of the lid could be turned down and easily brought in contact with the edge of the lower lid, to which it was fastened by four sutures. The gap thus formed was elliptical in shape, two inches in horizontal length, and an inch and a quarter in greatest vertical diameter. To fill this gap an elliptical piece of skin

three inches long by one and one-half in breadth was dissected from the left side over the seventh rib. care being taken to include as little as possible of the subcutaneous adipose tissue, and laid at once upon the raw surface prepared for it, which at the time it seemed to fit pretty accurately, having shrunken somewhat, though still thicker and more prominent than the surrounding parts. A superficial stitch was put in at either end of the ellipse to aid in holding the flap in place, and the whole covered with a thin, transparent plaster made of gold-beater's skin, cut large enough to extend toward the borders of the orbit and fastened at the edges by flexible collodion. Over this was laid a piece of soft muslin thoroughly smeared with vaseline, so that it could be easily removed without disturbing the plaster. A mass of absorbent cotton covered this, and a flannel bandage covering both eyes, and drawn tight enough to keep the transported skin closely pressed against the subjacent parts, completed the dressing.

The operation occupied thirty-three minutes, the patient being under the influence of ether, which did not cause much vomiting or subsequent depression. She was kept in bed, and small doses of whiskey given frequently, with the idea of promoting the activity of the circulation of the skin. The dressings external to the plaster were left undisturbed till the fourth day after the operation, and when removed revealed the transported piece in perfect coaptation, and assuming more of the color of the adjoining skin and less ghastly white in appearance than when first applied. So far as could be judged from appearances, there was union by first intention throughout, except that the length of the transported piece proved to be greater than was necessary; and there was a little overlapping at the ends of the ellipse, which became hard and dry superficially, and were subsequently pared off by the scissors. The external dressings were renewed in order to keep the parts warm and under pressure. The transparent plaster was not removed till the twelfth day, when it had become loosened. The sutures had been previously removed by lifting the edges of the plaster. For many days the tissues were so thick and swollen that the eye was completely closed; but before the end of a month considerable shrinking took place, and went on till the eye could be well opened and shut, as shown in the figures from photographs taken July 19th. At this date the transported piece measured as nearly as possible $1\frac{1}{4}'' \times \frac{3}{4}''$. For the last two or three weeks before this the shrinking process had seemed to come to a termination. In the third and fourth weeks after the operation there occurred an ulceration of the superficial parts of the skin

toward the ends of the ellipse, as in ordinary skin grafting; but at least two-thirds of the flap, including the middle portion, remained entire without ulceration, losing only the thinnest pellicle, such as would come away from a slightly sunburned surface.



The eye is now well protected, and the deformity in great measure relieved, as shown by the photographs, though the lid is not very flexible, owing, perhaps, in part, to the thickness of the skin employed for transportation.

Since the above operation I have had the opportunity of assisting at another of the same kind, which was performed, June 15th, by my friend, Dr. L. S. Pilcher, of Brooklyn, by whose courtesy I am permitted to refer to it here. The patient was a woman of thirty years, subject to epileptic attacks, in one of which she fell in the fire and was badly burned on the left side of the head and face, the resulting cicatricial contraction producing extreme eversion of both upper and lower lids. Wolfe's method was tried for the relief of the ectropion of the upper lid—the gap of $2'' \times 1.3''$ being filled by a piece of skin $2.6'' \times 1.7''+$, taken from the inner surface of the upper arm. This was much thinner than that in my own case taken from over the ribs, and shrank at once much more, so that it hardly filled the gap without stretching. No sutures were used to hold the flap in place, as the experience in my case seemed to prove them undesirable; but the same procedures were followed in every other respect. Union throughout took place in spite of much vomiting from ether and a subsequent epileptic seizure. The present result is very satisfactory, the ectropion being completely relieved, while the lid is much more flexible than in my case. An attempt to relieve the ectropion of the lower lid, by sliding upward a triangular flap from the cheek, made at the same time, failed of success.

The experience of these two cases under my own observation, with the history of those reported by others, leads me to think that the viability of very considerable pieces of skin transported with proper care may be relied upon in the majority of cases. As to the

size of the transported piece relatively to the gap to be filled, the most desirable place from which to take it, its thickness, flexibility, tendency to shrink, etc., with reference to adaptation to most perfect and permanent relief of ectropion—these questions can only be decided by time and comparison of results in different cases. Thus far the thinner and more flexible skin from the inner surface of the upper arm has seemed to serve the purpose best.

The plan of keeping the parts under moderate pressure warm by plenty of covering, and of promoting the activity of their circulation by frequent small doses of alcoholic stimulants during the critical period, seems to me logical.

NOTE.—December 18, 1880.—I have recently assisted Dr. Pilcher again in operating by transportation on the *lower* lid of the patient above referred to, where the method by sliding flaps had failed, leaving large cicatrices, and to-day had the satisfaction of seeing a very great improvement, in spite of loss of one of the two transported pieces from an erysipelatous attack.

My colleague, Dr. Rushmore, has also, within a few weeks, employed Wolfe's method, with thus far satisfactory results, for relief of ectropion of both upper and lower lids, in the case of a young boy whose face had been frightfully burned.

THE TREATMENT OF ECTROPION BY TRANSPLANTATION OF SKIN.

BY DR. LUCIEN HOWE,

BUFFALO, N. Y.

ALTHOUGH this method of operation is not entirely new to the profession, it has not, I believe, been formally brought to the notice of this society; and that fact, together with the apparent importance of the subject, would seem to warrant a few practical considerations concerning its application in a special instance, and the deductions to be made concerning it.

The ancient Indian plastic operation was simply modified by Tagliacozzi, when he took the flap from the arm instead of from the forehead or cheek, as had been previously done. In both instances, of course, an attempt was made to keep up the circulation till after the part had attached itself. But when M. Reverdin proved that small

particles of skin, after being entirely removed, would again grow on an ulcerating surface, it was the demonstration of a new principle. This method has been known from the first to English readers as that of "grafting," and I think we should retain the term "transplantation" to indicate the transfer of large flaps having no pedicle to fresh wounds of corresponding size. This distinction is to a certain extent arbitrary, and one merges into the other, just as in practice the latter method was gradually developed from the former. They are both, however, of quite recent date, and so few names, comparatively, have thus far been identified with the different stages of the process, that it is not difficult to trace the transition.

Mr. Lawson[1] was probably the first to employ grafting for the treatment of ectropion, and even in his earliest cases, ten years ago, made use of particles as large as a three-penny piece, although Reverdin had recommended that they be much smaller. In 1872 Prof. Ollier[2] transplanted pieces still larger; the same year, Wecker's suggestion in the "Annales d'oculistique" indicated a further improvement; and in 1875 Dr. Wolfe reported two cases where the injured integument was replaced "by a larger flap dissected from the forearm, and entirely separated from its attachment." At the Fifth International Ophthalmological Congress, Dr. Wadsworth, of Boston, also demonstrated the advantages of this method. Two equally favorable cases have recently been reported by Dr. Aub, of Cincinnati, and one by Dr. Noyes, while Zehender has made two attempts in the same direction, with partial success. The transplantation of large flaps has therefore been confined to ophthalmic practice, and indeed the possibility of such an operation seems to have been questioned or entirely ignored by some of the best surgeons.

The following passage from Holmes' Surgery illustrates the manner in which such attempts are usually regarded. The writer says: "Burger relates a case of partial success in the formation of a new nose on a lady, by a piece of integument completely cut away from the thigh; and Hoffacher, who was officially appointed to attend at the duels frequent among the students at Heidelberg, mentions some remarkable instances, which are attested by Chelius and Velpeau, of the reunion of parts completely sliced off by sword-cuts, *e.g.*, portions of the nose, lips, or chin. But no such license can be allowed in plastic surgery. The flap must retain its connection

[1] Lancet, Nov. 19, 1870.

[2] Bull. de l'acad., 2e Sér., I., 7, 1872.

to the adjacent living structure by a pedicle, which is to be severed only after complete union and cicatrization of the raw surfaces."

The error of such statements has been sufficiently demonstrated by the results of cases already referred to, and I venture to add still another to the list, for the reason: 1, that, from all I can learn, the transplanted flap was larger than any thus far mentioned; 2, that the plan of procedure differed slightly from that adopted by others; and 3, that while the operation is still on trial, each attempt furnishes important evidence for or against its final adoption. The

following outline of the case alluded to is made from more extended notes recorded at the time:

In February, 1877, I was consulted by a young lady who, when a child, had fallen face foremost into an open fire, and the injury sustained had resulted in an unsightly cicatrix, which covered the right half of the forehead, drawing together the surrounding tissues and producing an ectropion of the upper lid of the most complete type. At least the outer third of the line of the lashes blended with the eyebrow, and the remaining portion also displaced to such a degree as to expose almost the entire surface of the conjunctiva. The palpebral portion of this membrane had become swollen and thickened,

but, although it was quite impossible to close the eye, the ocular portion of the conjunctiva was not greatly injected, and the cornea remained entirely clear.

The patient also had convergent strabismus of the same eye, apparently of cicatricial origin, and the vision with +30 cyl. 90° was only $\frac{2}{200}$. In this case it would have been a hopeless task to take a flap from the forehead or cheek and twist it into an eyelid, and the Italian method therefore appeared at first to offer the best prospects for success. As a matter of preliminary trial, the arm was simply

fixed in the desired position by means of bandages, but after one restless night this arrangement was found to be sadly imperfect. An iron frame was then made, which, being fastened to the head, held the upraised arm firmly in place, but at the end of forty eight hours the pain was so excessive that the patient begged to be released.

Meanwhile my attention had been directed to the operation of transplantation, which in the present instance seemed to be particularly appropriate.

Accordingly, on March 21, 1877, chloroform was administered to the patient, and after correcting the strabismus, I proceeded to bring down the lid by making an incision parallel to the line of the lashes.

and just above them, which extended from the outer to the inner angle of the eye. The edge thus liberated was drawn down into its original place, but the thickened conjunctiva persisted in rolling outward instead of inward, and threatened to become a serious obstacle to success. One end of a thread was therefore carried upward, transfixing the hypertrophied membrane in the vicinity of the cul-de-sac, and near the inner angle of the eye, while the other end, also armed with a needle, was passed through a corresponding point near its outer portion. The conjunctiva was thus bent upon itself and suspended as it were over the thread, the extremities of which were attached to the forehead. Moreover, the strip containing the lashes was also fastened to the lower lid by three strong sutures, in order to avoid all unnecessary motion of the parts. There was thus produced upon the outer surface of the upper lid an elliptical wound which measured rather more than $1\frac{3}{4}$ inch in its longitudinal diameter and over an inch transversely. Its surface was even, free from fat, partially glazed, and bleeding very slightly.

Before commencing the operation a paper pattern of the desired flap had been made, and its outlines traced in ink upon the inner aspect of the right arm. It measured $3\frac{1}{8}$ inches long by $1\frac{3}{8}$ inch wide, being, of course, of elliptical shape, and this flap was carefully dissected up by an assistant, while the eye was being manipulated as above mentioned. Previous to the entire detachment of the piece, however, four fine sutures were introduced at the extremities of the principal diameters, for the sake of greater convenience in handling, and readiness in attaching it. The assistant was careful to free its surface from superfluous fat, and it was also placed upon the prepared spot without unnecessary delay.

It will be observed that the transplanted flap was very much larger than the space to be covered; but this allowance for contraction was none too great, and some slight difficulty was experienced in adjusting the edges, which were finally united by six or seven sutures in addition to the four already mentioned. The flap was then covered with a piece of gold-beater's skin which extended beyond the edges of the wound, and the region of the eye being thickly padded with charpie, a roller bandage was applied. The outer dressings were not disturbed for forty-eight hours, when, on removing the charpie, the parts were found to be in the desired condition, and the skin could be seen of its normal color.

On the eleventh day, the stitches holding down the upper lid, together with the thread under the conjunctiva, were removed and the

strabismus found to be entirely corrected. On the fourteenth day the inner half of the flap became discolored, and this appearance extended gradually over its entire surface, but involved only the epithelial layer, beneath which, a new one had been produced. On the seventeenth day, however, the inner corner of the flap appeared to be more seriously threatened, and a small strip along the edge, measuring two lines in breadth and four in length, became dry and was detached. On the 25th of April—about one month after the operation—a photograph was taken of the patient, which illustrates the proportionately large size of the flap.

This continued to shrink, however, and two months later presented the appearance shown in the second photograph, being then less than 1½ inch long and ⅝ inch wide. In this, it will be noticed that the wound on the arm had healed after the usual manner of such granulating surfaces. The patient left Buffalo for her home in Iowa, July 1, 1877, and letters, since received, state that the good effects still continue as apparent as when the last photograph was taken. The movements of the lid are naturally much restricted, but otherwise the eye gives her no trouble, and looks infinitely better than at first.

From one such case it is evidently impossible to form any conclusions as to the requisites for success; but, comparing this single observation with the experience of the writers before mentioned, I should infer it were advisable—

As to the surface of the wound:

1. That it be clean, and free from adipose tissue.
2. That its base be even.
3. That there be little or no hemorrhage at the moment of transplantation.

Then, as to the flap:

1. That it be at least one-third larger than the wound.
2. That its inner surface be clean and free from fat.
3. That it be subjected to no undue violence.
4. That it be secured in its new position without delay.

Finally, as to adapting the parts to each other:

1. That the edges should fit evenly.
2. That they should be secured firmly.
3. That the parts should be kept warm and dry for at least twenty-four hours.

The advantages of this method are so evident as to require but few words of explanation:

1. A second scar is not produced in the attempt to rectify the deformity, as by the Indian operation.

2. There is no pain caused by keeping the arm immovably fixed, as by the Italian operation.

3. The edges of the transplanted flap can be adjusted with the greatest nicety, which is not the case with either of these methods.

4. If the attempt should prove a complete failure, as a result of any accident, the deformity would remain virtually as at first.

In general, therefore, we have by it much to gain, and comparatively little to lose.

We are always in danger of judging too partially of any method or agent which has happened to serve us well. But, concerning this operation for the treatment of ectropion by transplantation of skin, when we see what satisfactory results have followed its employment in even a few cases, and when we remember, too, the great gains to be obtained, the subject would at least seem to be worthy of more frequent and more prominent mention in ophthalmic literature.

REMARKS.

DR. AGNEW made two suggestions: one was that the flap should be taken from the inside of the arm, and not the forearm, for by so doing there was no scar exposed upon the forearm, which was a matter of considerable importance when operating upon women. Another suggestion was that in performing this operation the scissors should be used instead of the scalpel. Having picked a little hole in the skin with a scalpel, a pair of small probe-pointed scissors should be taken and run around the flap in the same manner as a drygoods clerk runs through a piece of goods upon the counter; this would save a great deal of time. The objection to the scalpel was, that in cutting you dipped down at certain points deeper than at others. By means of the probe pointed scissors you might encircle the flap very quickly, which was a matter of importance wherever skin was to be transplanted, for *time* entered into this operation as an element of success.

DR. KNAPP remarked that in ectropion operations he preferred the scissors, but for plastic operations he preferred the knife on account of its pressing less upon the tissues.

DR. NOYES gave the result of his experience with the treatment of ectropion by transplantation. He had had three cases: in one the operation resulted successfully, in two it was a failure. One failure was due to the fact that the flap was not sufficiently secured. In designating this operation it had been suggested to his mind that a special name should be used, and he had spoken of it as the operation "by transportation." In children he had not found the arm a suitable region from which to take the skin; he had found the side of the

thorax the most satisfactory locality. In regard to little details he would say it was desirable to have a pattern the shape of the flap to be cut. This was best made from a piece of adhesive plaster, which would adhere to the skin. In outlining the piece of skin to be removed, he recommended the use of the scalpel going just deep enough to draw blood. The scissors were then to be used, to run around the flap and to remove it, leaving behind the adipose tissue. In the majority of instances gold-beater's skin was alone used to support the flaps; but he had found that the addition of collodion gave greater support. It did not appear that its contraction was in any sense objectionable. He remarked that, in the case in which he removed a piece of skin, the flap was two and a half inches by one and a half inch. The child was last seen three months after the operation, when the transported piece measured one inch by one-half inch.

Dr. O. F. Wadsworth, of Boston, Mass., remarked that he had reported a case of this kind some four or five months after the operation. At that time the patient was shown to one of the Boston medical societies. The flap then measured precisely the same as it did when measured six or seven weeks after the operation. It was then cold weather, and when the patient came in from out of doors the flap looked a little whiter than the surrounding tissue; but the patient said this was not the case at other times, and also that the tendency to look white was diminishing. Tested with the dividers, the sensibility was precisely the same on the transplanted piece as on the skin around it.

Dr. Charles J. Kipp remarked that he had performed this operation four times, twice in the same individuals, and all upon the lower lids. His operations had not resulted as favorably as would have been desirable. In one the flap sloughed entirely; in another the lower lid was destroyed by secondary syphilitic disease, and though for a few days the result was all that could be wished, now the ectropion was as bad as before the operation.

Dr. Wadsworth remarked that his case occurred in the lower lid.

Dr. Agnew inquired if the use of the adhesive plaster, referred to by Dr. Noyes, would not redden the flap when it was removed, and thus, by interfering with its circulation, cause it to die.

Dr. Noyes replied that he recommended that it should be applied only long enough to draw the necessary outline.

INTRA-OCULAR LIPÆMIA.

BY DR. ALBERT G. HEYL,

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LIPÆMIA may be defined as the name applied to a state of the blood characterized by the presence of free fat in the serum of the blood. It may be either a physiological or pathological phenomenon.

1. *A physiological phenomenon.*—As is well known, during the process of digestion the emulsified fat is absorbed both by the lacteals and blood-vessels; reaching the lungs, it is there at first completely transformed, so that in the blood from the left side of the heart no trace of it can be found. As digestion proceeds, however, especially if the food be rich in fat, the transformation in the lungs is incomplete, and free fat may then be found in the general circulation. In this physiological lipæmia the fat is in a state of fine division, and in the lower animals is frequently present in such quantity as to produce a milky hue of the blood. Whether this "milky blood" be ever a normal phenomenon in man, I venture to think is an open question.[1]

2. *A pathological phenomenon.*—In certain pathological states of the liver and kidneys, in peritonitis, cholera, in old drunkards, the blood has been noticed at times to be of a milky hue, from the large

[1] This view is contrary to the opinion of so able a physiologist as Professor Dalton (Human Physiology, page 199). He says that the "milky blood" observed in certain cases of apoplexy is a purely physiological phenomenon having no connection with the cerebral symptoms. Against the statement that it is a physiological phenomenon are: 1, that in the immense numbers of ophthalmoscopic examinations of healthy eyes which are constantly being made, the peculiar appearances of intra ocular lipæmia would have been seen and described; 2, its peculiar association with diseased conditions, as diabetes mellitus, etc.

With regard to the pathological effect of this milky blood, I think that this much may be accepted: 1, given a healthy circulatory apparatus, the lipæmia will produce no pathological change of note, provided its presence be not constant; 2, given an abnormal circulatory apparatus, and the lipæmia may give rise to fatty masses occluding the vessels.

quantity of emulsified fat which it contained; especially has it been noticed in connection with diabetes mellitus. Rollo, to whom we owe the first extensive treatise on this disease (London, 1798), noticed it, and since then Kussmaul, Virchow, and others have likewise seen instances of it.

Distinct from this is a form of lipæmia met with in connection with fractured bones. It is now a well-established fact that after an injury opening the medullary canal of a bone, free fat from the medulla may find its way into the blood, fat-emboli may form, and even death result. In this form of lipæmia the fat is not evenly distributed through the blood in a finely divided state, but probably exists in the form of colorless globules, for the embolus which may be formed therefrom is "a clear, homogeneous, colorless mass."[1]

Two forms in which free fat is found in the blood may, then, be recognized:

1. *The globular form.*—In this case the free fat enters the circulation without being previously subjected to any preparatory process.

2. *The molecular form.*—In this case the fat is emulsified; it enters the circulation in a finely divided state, the molecules requiring for their recognition a power of 600 or 700 diameters.

The distinction is important, because in the first place there is a decided tendency to the formation of fat-emboli. In the second place it is doubtful whether the fat would give rise to any abnormal condition, provided the circulatory apparatus were in a healthy state.[2]

It is the purpose of this paper to discuss some points relative to intra-ocular lipæmia, that is to say, the intra-ocular phenomena which occur in lipæmia.

1. The intra-ocular lipæmia characterized by the presence of fatty globules in the intra-ocular circulation. Very little is known about this; so far as I am aware, its existence in man has never been observed. There is, however, an interesting and suggestive experiment by Czerny bearing on this subject, which ought to be mentioned. A quantity of fat was injected into the jugular vein of a dog; the fundus of each eye was normal. Twenty-four hours after the injection the left fundus was marked by numerous retinal hemorrhages; a few hemorrhages were also observed in the retina of the right eye. Two days after this the hemorrhages had increased in number. Here,

[1] Busch: Fett Embolie, Virchow's Archives, XXXV., p. 321.

[2] See note on previous page.

doubtless, there was intra-ocular lipæmia, fat-embolism, retinal hemorrhage.[1]

2. The form of lipæmia in which the fat is in a molecular or finely divided state. As has already been stated, when the fat is present in sufficient quantity, blood drawn from a blood-vessel is of a milky hue. One would naturally suppose that under such circumstances some abnormal intra-ocular change would be observed, and such, in fact, is the case.

On January 30, 1880, I had the honor to present before the Philadelphia County Medical Society a picture representing the intra-ocular appearances observed by me in a case of diabetes mellitus, whose blood was of this milky hue. The patient was under observation about six weeks. A full history of the case, including results of autopsy, microscopic examinations, etc., has been given by Dr. Louis Starr, in the New York *Medical Record*, May 22, 1880. I can only give a brief abstract.

The patient, Henry W., aged twenty, was admitted to the medical ward of the Protestant Episcopal Hospital, under the care of Dr. Louis Starr, Nov. 8, 1879. On admission he was weak and much emaci-

[1] This experiment is of such interest, that I will give the main points, taken from Czerny's description:

Feldman, ein kräftiger Jagdhund, mass am 23 Januar, 1875, 3½ Nachmittag, in Rectum 39.4 Gr. C. Respiration ruhig—36. Puls, 132. Augengrund normal. Um 4 Uhr—Einspritzungen von 20 Grm. Schweinefett von 40 G. in die Vena Jugularis. Bald darauf, heftiges Bellen, Streckkrämpfe im Rücken, Koth und Urin Entleerung, Unfähigkeit zu stehen. Puls verlangsamt, Respiration sehr beschleunigt. 4½ Uhr.—Die Krämpfe haben nachgelassen. Der Hund liegt bewusstlos. 7 Uhr—Der Hund lauft schon schwankend.

Januar 24, 6½ Uhr früh.—Er frisst und lauft gut, ist aber noch traurig.

Januar 25.—Rechtseitige Pneumonie. Respiration und Puls sehr beschleunigt. Im linken Auge, besonders nach innen oben sieht man mit dem Augenspiegel in der Netzhaut zahlreiche dunkelrothe meist rundliche Haemorrhagien mit lichterem Hof zerstreut, die sich besonders vom Metallgrunem Tapetum sehr schön abheben. Ihre Grosse wechselt von den kaum sichtbaren bis zum Durchmesser der Papilla. Im rechten Auge sind die Blutpunkte weniger zahlreich.

Januar 27.—Die Haemorrhagien in der Netzhaut sind noch etwas umfangreicher geworden.

Februar 25.—Von den Extravasaten sind nur unbedeutende Spuren zurückgeblieben. Choroidal Epithel in diesen Stellen nicht alterirt. Hund ist gesund. Ich habe unter allen meinen Versuchen blos noch ein zweites Mal bei demselben Thiere solche embolische Haemorrhagien der Netzhaut gesehen während man bei der Obduction von an Fettembolie gestorbenen Thieren sehr haufig ähnliche Haemorrhagien im Gehirn, Herzfleish und Lungen findet.—*Berliner klinische Wochenschrift*, November 1 and 8, 1875.

ated. Investigation showed the case to be one of marked diabetes mellitus. The patient complained of dimness of sight, and was sent to me for examination. The peculiar appearances of the fundus suggested to me that possibly the blood might be leukæmic. To settle the question, Dr. F. P. Henry made a count of the blood by means of Gowers' hæmacytometer, with the following results, viz.: number of red corpuscles to cubic millimetre, 4,205,000, the normal number being at least 5,000,000; number of white corpuscles to cubic millimetre, 50,000. There was, then, 1 white to 84 red corpuscles, the normal relation being 1 white to 350 or 400 red. Although the red corpuscles were somewhat diminished, the blood was not leukæmic. The blood which was drawn on this occasion, as well as at other times, presented a peculiar appearance. On pricking the finger, a drop of blood would escape, having very much the color of a piece of pink coral, followed by a thick, whitish fluid, of the color and consistence of an oil-emulsion. On examining this with a low power, 250 diameters, a few blood-corpuscles could be seen upon a dim, misty background, barely discernible. Examination with a power of about 600 showed the granular nature of this background, and examination in various ways left no doubt but that it was fat in a finely divided state. I append the report of the ophthalmoscopic examination

DR. ALBERT G. HEYL'S REPORT.

The patient presented himself for examination on November 11, 1879. Examination with the ophthalmoscope showed that there were opacities in each crystalline lens; the pupils were dilated with atropia, and it was then found that the nucleus of each lens was opaque; the cortical structure, though sufficiently clear for examination of the interior of each eye, was traversed by radiating spikes of opaque lens-tissue.

The moment my eye caught the details of the fundus, I saw the remarkable appearance which I shall endeavor to describe. The appearance was the same in each eye, and I was able, through the skill of Dr. Charles B. Nancrede, to obtain a very accurate painting of it.

The fundus was free from any evidence of the existence or pre-existence of inflammation; the nerve-margin was well defined, the vessels were not tortuous; no retinal lesion, no hemorrhagic clots were seen.

The abnormal appearances which attracted attention were:

1. The abnormal color of the blood in the retinal vessels. As is well known, the retinal vessels are, with the exception of the optic papilla, the most striking objects seen in ophthalmoscopic examinations of normal eyes—the arteries being characterized by their small size and yellow-red color, the veins by their large size and dark, cinnabar-red color. In this case, however, the vessels were all apparently of the same color; this color may be described as a light salmon. By color alone, then, the arteries could not be distinguished from the veins. This was the case when the light from the ophthalmoscope was thrown directly on the vessels; by rotating the handle of the mirror so as to deflect the light, a dark axis could be seen in the large venous branches.

2. The apparently large diameter of the vessels; the vessels appeared to have about twice the *normal* calibre.

This curious phenomenon may be explained satisfactorily in this way. When we examine the fundus of an eye we apparently see the full diameter of the vessels; accurately speaking, this is not true. Could we examine the vessels under sufficiently favorable circumstances we would see a column of blood-corpuscles in the axis of the blood-stream, and surrounding this axial current a peripheral current composed of the plasma of the blood. Under ordinary circumstances this peripheral portion of the blood-current is invisible in ophthalmoscopic examinations; it can only be recognized by special search, so that what appears to be the diameter of the vessel is really the diameter of the axial current. Could we easily recognize the peripheral current the retinal vessels would seem to possess about double the calibre seen under ordinary circumstances.

In the case under consideration the serum of the blood was opaque, and therefore visible, by reason of the presence of fat in abnormal amount. Hence, the vessels appeared to possess double the usual calibre.

With regard to the general color of the fundus, the best idea of it may be obtained by taking Fig. 45 of Jaeger's ophthalmoscopic atlas to a well-lighted window, and allowing the sunlight to fall upon it. How much the lipæmia had to do with the general color of the fundus, I cannot say; for the pigment of the fundus was sparse, and the patient, while not an albino, had very light, almost white hair, light irides, etc. Under normal circumstances, of course, the fundus would have been of very light color. The examinations were generally made with an ordinary concave ophthalmoscopic mirror. The

refraction of the eyes could not very accurately be determined, owing to the cloudy condition of the lens; it was, however, nearly emmetropic, perhaps a slight grade of hypermetropia existed. This condition, to which the name of *lipæmia retinalis* may be given, is therefore characterized by the light salmon color of the blood contained in the branches of retinal vein and artery, by the apparently large calibre of these vessels, and possibly by the very light color of the fundus oculi—these appearances being due to the presence of fat in abnormal amount in the serum of the blood.

A peculiar ophthalmoscopic picture was evidently offered for study in this case. Extended search having failed to reveal any recorded description of this condition, I proposed the name of retinal lipæmia for it; as still more accurate, I have adopted the name of intra-ocular lipæmia.

The only known intra-ocular change likely to be confounded with that due to molecular lipæmia is intra-ocular leukæmia; both very rarely come within the observation of the oculist, and both may be accompanied with marked color-change of the fundus and the retinal vessels. It will be well, therefore, to consider the differential diagnosis. Let it be remembered that we are not about to consider the differential diagnosis of two forms of retinitis, but of two intra-ocular conditions characterized simply in the one case by a lipæmic, in the other by a leukæmic state; doubtless retinitis with hemorrhage may occur in connection with either condition, but it will not be considered in the following analysis. The problem before us, then, is this: given two eyes with normal circulatory apparatus, in one of which the blood is markedly lipæmic, in the other markedly leukæmic, to distinguish the one from the other. Two points of contrast claim attention:

1. *The color of the fundus.*—In leukæmia the color is an orange-yellow, which does not disappear when the examination is made with white light.[1]

In lipæmia the fundus is of a light salmon-red color when examined with gaslight; how it would appear if sunlight were used for the illumination I cannot say from personal observation; probably the reflex would be mainly white tinged by a shade of pink. The distinction is supported by the difference in the macroscopic appearances of lipæmic and leukæmic blood: the former is of a pinkish white; the latter, in pronounced cases, of the color of pus.

[1] Knapp's Archives, vol. i.

2. *The color of the retinal vessels.*—In leukæmia the veins are pale (Gowers), of a bluish red approaching a rose (Becker), while the arteries are of a pale yellow. In lipæmia arteries can with difficulty be distinguished from veins, and both have nearly the same color as the fundus.

The distinction is marked and is caused by the different light-reflecting power of a mass of white corpuscles and a quantity of molecular fat evenly distributed through the serum.

3. *The apparent size of the retinal vessels.*—In lipæmia the retinal vessels are apparently about double the size of those of a normal eye of the same refraction. This, as has already been explained, is not due to an actual increase in size of the vessels, but to the presence of the molecular fat in the plasma of the blood, thus causing the full width of the vessel to appear.

In leukæmia, all agree that the veins appear unusually large and the arteries very narrow. From actual measurements of a carefully drawn picture of this kind,[1] the following conclusions may be deduced: 1, that the apparent size of the retinal arteries is about equal to those which would be observed were the blood in a normal state; 2, the calibre of the retinal veins is apparently very much increased, so that they appear four times larger than those corresponding arteries, instead of being only one-third larger, as under normal circumstances. The latter change in leukæmia has been ascribed to an atony of the vessel-coat (Gowers[2]).

Allowing, however, this to be the case, there can be little doubt but that some other element enters into the explanation; for in observations of Jaeger[3] on the retinal vessels, in cases of paralysis of the vasa-motor nerves, the arteries were normal in calibre, and the

[1] The measurements of Gowers' picture of intra-ocular leukæmia are as follows: horizontal diameter of disk = 18 mm. Allowing 1.6 mm. as the mean diameter of the disk (Schultze), the picture is magnified 11.25 times. From data derived from a picture by Jaeger (Einstellungen des diop. Apparat.), a vein should have an apparent width of 1.125 mm., and an artery of .75 mm. under a magnifying power of 11.25. But in Gowers' picture the vertical vein has a width of 2 mm., and the artery .5 mm. Therefore, the vein in the leukæmic case was of nearly double the normal width, the artery slightly diminished. Considering, however, the slight inaccuracy which might attend the measurement of the width of a retinal artery, also the possible variation in the width of normal vessels, the statement in the text will, I think, be a fair one.

[2] Medical Ophthalmoscopy, p. 190.

[3] Ergebnisse der Augenspiegel Untersuchung, p. 109. See note at the end of this article.

veins, at the most, showed only an increase of three-fourths the normal calibre, whereas, in this case of Gowers, it was about double.

In the light of my case of lipæmia, I offer a different explanation; to make it more intelligible, I will give a brief extract from Cohnheim's description[1] of the normal circulation. After referring to several points of difference between arteries, veins, and capillaries, he thus proceeds: "Of special interest is, further, the different appearance of the peripheral zone in the three kinds of vessels; for the *red blood* column does not fill the lumen of the artery completely, but there remains between it and the inner contour of the vessel-wall always an uncolored seam of varying breadth, in which one never sees a red, and very seldom a white corpuscle, and in which, therefore, simply plasma flows. Also, in the veins a similar zone is seen, composed of plasma; but in this, one finds regularly single colorless corpuscles, which move along much slower than the axial current of red corpuscles." This difference as regards the absence of corpuscles in the peripheral current of the artery, and their presence in that of the vein, is probably due in great measure to the difference in rapidity of the two blood-currents.

Observe the difference between the arterial and venous blood-streams: in the arterial, the blood-corpuscles keep in the axis of the vessel; in the venous, the white corpuscles get into the peripheral layer. Remember now that in ophthalmoscopic examination what appears to be the whole width of the vessel is really only the width of the axial current,[2] and also that in leukæmia the white corpuscles are more numerous than in healthy blood, and we can easily explain the normal size of the artery and enlarged size of the vein. As the arterial blood swiftly passes through the retinal artery, the corpuscles keep in the axis of the stream, and the artery appears of the normal size. In the vein, however, the white corpuscles get into the peripheral current to such an extent as to make it visible: hence its enlarged size.

It is, moreover, conceivable that at times the white corpuscles would collect to such a degree in the peripheral layer as to give rise

[1] Allgemeine Pathologie, p. 115.

[2] This fact deserves more attention than it has received. I will quote Professor Jaeger's description: "Von den Netzhautgefässen sieht man unter physiologischen Verhältnisse mittelst des Augenspiegel nur den roth gefärbten Theil der Blutsäule; das ganze Gefäss jedoch ist seinem Querdurchmesser nach nahezu doppelt und darüber so breit als der eingeschlossene sichtbare rothe Blutstrom." (Ergebnisse der Augenspgl. Untersuchung, p. 46.)

to a whitish margin to the vessels. The acute observations of Becker have taught us that this actually occurs in retinitis leucæmica. It is figured in his picture of this disease. A vessel is pictured markedly tortuous; close to the tortuosity the whitish edges of the vessel are seen—due, in my opinion, to the collection of corpuscles in the peripheral current of the blood-stream. As the vein approaches the disk its course is straighter, and the whitish margin is absent, because the current has regained sufficient speed to bring back into the axis of the vessel some, at least, of the white corpuscles. It is but right to say that Becker's explanation is that the whitish margin is caused by the diapedesis of the corpuscles through the vessel-coats: but the fact that this peculiar appearance was noticed only at the tortuous portion of one vessel, and was absent in all the others, is against this hypothesis.

One point more may be mentioned, viz., the flattened appearance of the retinal veins which has been noticed in leukæmia. The same appearance was seen in my case of lipæmia. The phenomenon is due, in my opinion, not to an actual flattening the result of intra-ocular pressure upon an atonic vein, but to the anatomical shape of the normal retinal vein.[1] The cross-section of a retinal vein is an ellipse, the major action of which may be considered as lying in the retina perpendicular to a line drawn from it to the centre of rotation of the eye. To put it in other words, when we examine a retinal vein with the ophthalmoscope, the curve of the vessel turned toward the observer's eye is not the curve of a cylinder, but of a cylindroid, *i.e.*, a body like a cylinder, but having for its base an ellipse instead of a circle.

So long as the blood-current is composed of the ordinary ingredients, and the axis of the current appears only to the examiner, no very striking flattening of the blood stream would be observed. Let, however, the peripheral layer of the blood-current become visible, and the broad side of an elliptical curve will appear to the eye. Thus may be explained the apparent flattening of the retinal veins in lipæmia and leukæmia.

Let us now turn our attention to an entirely different point of the subject, viz.: Can this intra-ocular lipæmia produce any disease of the structures of the eye?

From what has been said in this paper already, we have learned

[1] Schwalbe: 'Zur Lehre von der Ernährung der Netzhaut.' Graefe's Archiv, Bd. XXVI., 1, S. 72.

that when globular intra-ocular lipæmia exists, we may have extensive retinal hemorrhage, the result of fat embolism. The observation of Czerny is important in its bearing upon the subject of intra-ocular embolism. Upon this matter the limits of this paper forbid me to say more.

With regard to the pathological effect of intra-ocular lipæmia of the molecular form, I wish to say a few words. I shall confine myself simply to the condition as manifested in diabetes mellitus, because the case referred to already had this disease; and further, diabetes mellitus is accompanied by certain well-known extra-ocular complications, which will serve to make my meaning plain.

Diabetes mellitus in its later stages is frequently characterized by the formation of boils, carbuncles, gangrene of the lung, and gangrene of the extremities. These phenomena may be explained as being caused by the abnormal character of the blood, in consequence of which the nutrition of certain tissues dies. This explanation is so indefinite that it is unsatisfactory; it gives no clue as to the modus operandi. The following explanation I offer with diffidence, because there are many who can speak on this subject with far more authority and knowledge than I can claim. I only suggest it because it offers, in my opinion, a solid base upon which to rest my hypothesis for the causation of the cataract and retinitis of diabetes mellitus.

Observe, then:

1. That all the extra-ocular complications named have this common feature, viz., the necrosis of tissue.

2. That this necrosis of tissue doubtless is the result of interrupted circulation.

3. That this interruption of circulation may be caused by occluding masses of fat, for in diabetes mellitus the "blood, *as a rule*, contains a larger amount of fat than usual,"[1] and in my own and Sanders'[2] cases of lipæmia masses of fat were found occluding the vessels.

Bearing these points in mind, consider the peculiar character of diabetic retinitis: it is hemorrhagic, sometimes simple retinal hemorrhage is discovered, at other times hemorrhagic retinitis such as occurs in cardiac disease; quite noticeable is also the frequency of vitreous cloudiness, "in all probability of hemorrhagic origin,"

[1] Reynolds's System of Medicine, vol. v., art. Diabetes Mellitus, by Brunton.

[2] Lipæmia in Diabetes and Fat-Embolism. Sanders and Hamilton, Edinburgh Med. Journal, July, 1879.

(Leber). Recalling Leber's hypothesis[1] of the embolic origin of many cases of hemorrhagic retinitis, I have come to the conclusion that the diabetic retinitis is a hemorrhagic retinitis, caused by occluding masses, probably of fat, occluding the capillaries or minute vessels. If we look, then, simply at the immediate cause, we may classify the diabetic retinitis with the extra-ocular complications which have been mentioned. Though it be that in the latter we have necrosis of tissue and in the former not, that is a mere accidental difference; this is proved by the well-known fact that embolism of the central artery (a terminal artery) does not lead to necrosis of tissue.

Now, if the above reasoning be true, we may further inquire whether the diabetic cataract may not likewise be caused by the occlusion of some of the intra-ocular vessels; whether, in other words, the cause which I have offered for the other complications of diabetes previously mentioned may not originate this one.

The connection between diabetes and cataract, as is well known, has no satisfactory explanation. The hypotheses which have attracted most attention are those which point to some abnormal constituents of the humors about the lens; but they need to be braced by much stronger facts than investigation has yet produced, to keep them from crumbling to pieces.

Beyond question, any hypothesis respecting the causation of a complication of a disease has presumption in its favor when it fairly explains other complications of the same disease; also, the larger the number of complications thus explained, the stronger the presumption in favor of the hypothesis.

I conclude, then, that I have presumption in favor of fatty obstructing masses in the intra-ocular blood-vessels as a cause of diabetic cataract, provided there exists reasonable ground for supposing that such a cause could produce cataract at all.

Observe that the question essentially involved in this proviso does not necessarily involve the method by which the lens is immediately nourished; this problem is as yet unsolved. The question is this: Can an abnormal state of any part of the intra-ocular vascular system be the cause of cataract? I think so: 1, on the general ground that the nutrition of all tissues is derived eventually from the neighboring blood vessels; obstruct these blood-vessels sufficiently, and the nu-

[1] Graefe und Saemisch, Bd. V., Th. v., S. 570. Also vide Michel: Deutsches Archiv f. klin. Med., XXII., 43.

trition of the tissue must suffer; 2. the cataract of ergotism[1] may reasonably be ascribed to a pathological state of the intra-ocular vessels, and it is quite possible that other instances could be added, were the etiology of cataract not involved in so much obscurity.

Thus, I have offered a hypothesis to explain the retinitis and cataract of diabetes mellitus. As to the method of formation of the fat-masses spoken of, much cannot be accurately said. It is true that the subject of fat-embolism has attracted considerable attention, but the investigations, clinical or experimental, bear almost altogether upon what I have called in this paper globular lipæmia; in this case, naturally, the globules of oil would occlude the capillaries or smaller arteries, even when the circulatory apparatus is in good condition. In the molecular form we must conclude, from physiological phenomena, that there is no special tendency to the formation of these obstructing masses; that is to say, given a normal state of the heart and vessels, a normal state of the blood, excepting the presence of molecular fat, and it is in the highest degree probable that no obstructing masses of fat would form. That these obstructions may form, however, in certain *pathological* states of the system, would seem to have been demonstrated.

I have thus spoken guardedly on this subject because there are many points connected with it involved in an obscurity which the light of future investigation alone can dispel. I am conscious that my hypothesis is open to assault—not, however, I believe, from inherent weakness, but from the lack of certain data which, in the present state of the science, cannot be obtained. I offer it with the hope that they to whom the rare opportunity of examining microscopically the diseased eyes of diabetic patients is given, may have their attention drawn to a line of investigation which may lead to

[1] Becker raises a doubt as to the connection between ergotism and cataract. (*Graefe und Saemisch Handbch.*, page 226, vol. v., part V.)

The observations of Meyer are said not to afford very convincing proof of any connection between the ergotism and cataract, and also not to have been established by the observation of others. Observe, however, that ergotism is practically now an unknown condition, and thus no opportunity is offered at present for studying its clinical relations; also it does not appear from Meyer's description that the cataract developed with extreme rapidity; it was months after the attack of ergotism that patients presented themselves for treatment of defective sight: it may therefore be easily seen why Meyer's observations have received so little corroboration. The strongest point in Meyer's observations seems to me to be the fact given that, in a collection of between two and three hundred people attacked with the disease, more than twenty presented themselves with cataract.

the clearer conception of the obscure manifestations of an obscure disease.

NOTE.—The observations of Jaeger, since my article was sent in for publication in the "Transactions," have appeared to me not quite pertinent to the subject of atony of the retinal veins, for the retinal veins are peculiar in that they are destitute of a muscular coat. The *primary* effect of vaso-motor paralysis on a structure of this kind would be nothing.

Nevertheless, the position which I have taken with regard to Gowers's explanation is, I believe, correct; for it is difficult to understand how the retinal vein, composed of outer connective-tissue coat and inner one of endothelium, can become atonic, and furthermore, doubtless the retinal veins under normal circumstances are quite flaccid.

REMARKS.

DR. KNAPP said that he had recently seen two cases of retinitis diabetica. One case, a cataract patient upon whom he had operated a year ago, showed a well-marked neuro-retinitis. In the other case the patient, a woman, suddenly became blind in one eye, and presented the symptoms of embolism. A few days later the picture of embolism was still more pronounced. There was a milky appearance of the retina, largely dilated dark veins, and the fovea centralis of the yellow spot was cherry-red. In about five days it began to clear up, and the vision improved to $\frac{1}{200}$. The retinal vessels shrank then to a minimum and the disk was white. Sight totally lost. This condition was followed by iritis, and a most painful glaucoma, on account of which I removed the eye. The patient's health improved. The other eye was carefully watched, but never showed any abnormity, the fundus in particular being normal.

DR. JOHN GREEN thought the position taken by Dr. Heyl, in regard to the appearance of the size of the vessels, was untenable.

DR. HEYL wished simply to say in reply that the position which he had taken was the one Prof. Jaeger had laid down (vide Note 2, p. 61. Dr. Heyl's paper), and he would state further that repeatedly he had been able to detect this same appearance.

DR. JOHN GREEN reiterated his belief that it was impossible for so large a portion of the lumen of the canal to be occupied by transparent blood while only a small portion of it was occupied by red blood.

DR. HEYL said in reply that he was not aware of the existence of this condition of things before he read Prof. Jaeger's observations; he thought, however, that they were true. Where two vessels crossed you could often see a faint line indicating a distinct space which was filled in by the transparent peripheral layer of plasma, so that the whole width of the vessel would be about double the width of the red-blood current.

A TABULAR REPORT EXHIBITING THE POSITION OF THE AXIS OF THE CYLINDER IN SIMPLE, COMPOUND, AND MIXED ASTIGMATISM; THE MYOPIC AND HYPERMETROPIC FORM COMPARED. WITH REMARKS.

BY DR. W. S. LITTLE,

PHILADELPHIA, PA.

I HAVE taken in succession from my note-book 225 cases of refraction involving astigmatism, and tabulated them; so as to exhibit and compare the frequency of the position of the principal emmetropic meridian in myopic and hypermetropic astigmatism; the tables are not presented, the result being stated.

The statement of authorities that, in Am., it is at 180°, or horizontal, and in Ah. at 90°, or vertical, is soon observed in the correction of simple As.; but I desired to investigate if the same held in the correction of compound and mixed astigmatism.

More cases might have been quoted, but sufficient are presented, to exhibit the point investigated. Other points in regard to refraction are stated that may be interesting, which were brought out by the method adopted in arranging the tables. One-sixtieth ($\frac{1}{60}$) of As. is the lowest correction. All were corrected under a mydriatic, atropia, or duboisia, and full vision obtained, save where a lesion of transparency or amblyopia prevented.

The 225 cases of astigmatism, were divided as follows:

Simple As. 102 cases, or 45½ per cent., divided as follows:

Am. 40 cases, or 39½ per cent.

Ah. 62 cases, or 60½ per cent.

Compound As. 114 cases, or 50 per cent., divided as follows:

Am. 57 cases, or 50 per cent.

Ah. 57 cases, or 50 per cent.

Mixed As. 9 cases, or 4½ per cent., divided as follows, and count as 18 cases:

Am. 9 cases, or 50 per cent.

Ah. 9 cases, or 50 per cent.

Total, Am. 106 cases, or 45 per cent.

Total, Ah. 128 cases, or 55 per cent.

Eyes affected: O. U. 142
O. D. 43
O. S. 49

234
less 9 mixed, counted as 18 cases, as follows:

225

Simple As. 102 cases:		Compound As. 114 cases:	
Am. O. U. 23	Ah. O. U. 41	Am. O. U. 39	Ah. O. U. 33
O. D. 8	O. D. 8	O. D. 10	O. D. 13
O. S. 9	O. S. 13	O. S. 8	O. S. 11

Mixed As. 18 cases:

Am.	Ah.
O. U. 3	O. U. 3
O. D. 2	O. D. 2
O. S. 4	O. S. 4

Total, Am..... 106
Ah..... 128

The 225 cases involved 450 eyes examined; of these, 365 eyes are exhibited with As., or 78 per cent.:

O. D. 182
O. S. 183

The 103 eyes remaining were affected with E., M., H., or As., less than $\frac{1}{6}$, opacities, diseases, or injuries, and are exhibited in the tables and amount to 22 per cent.:

O. D. 52
O. S. 51

Total..... 468
less 18 mixed As.

450 eyes.

Table A exhibited simple astigmatism.
Table B exhibited compound astigmatism.
Table C exhibited mixed astigmatism.
Table D exhibited all combined.
Table E exhibited the number of eyes equal or unequal in refraction in a given case:
also the degree and axis of those equal;
also the degree of those equal;
also the axis of those equal;
also the eyes unequally affected;
also the condition in compound As. with M. and H.

Table 1 exhibited the degree and axis in the number and order of frequency in Am. and Ah.

Table 2 exhibited the axes in the number and order of frequency in Am. and Ah.

Table 3 exhibited eyes affected in Am. and Ah.

Table 4 exhibited recapitulation of results.

The 365 cases, or 78 per cent., affected with As. are divided as follows :

Table A exhibited : Simple As. 161 cases, or 44 per cent. :
O. D. 83 ; O. S. 78.
Am. O. D. 31 ; O. S. 31, or 38 per cent.
Ah. O. D. 52 ; O. S. 47, or 62 per cent.

Table B exhibited : Compound As. 180 cases, or 49½ per cent. :
O. D. 85 ; O. S. 95.
Am. O. D. 44 ; O. S. 51, or 52 per cent.
Ah. O. D. 41 ; O. S. 44, or 48 per cent.
(M. and H. corrected, I took As. as if Simple As. existed.)

Table C exhibited : Mixed As. 24 cases, or 6½ per cent.
O. D. 14 ; O. S. 10.
Am. O. D. 7 ; O. S. 5, or 50 per cent.
Ah. O. D. 7 : O. S. 5, or 50 per cent.
(As a bicylindrical lens was required in these cases, they count as 24 cases—12 for Am. and 12 for Ah.)

Table D exhibited : The cases are collected as if all were Simple As. and Am. and Ah., and O. D. and O. S. compared as to their degree and axis.

Result of Analysis and Comparison as to the Frequency of the Position of the Axis in Am. and Ah.

Table A exhibited—Simple As. :

Am. 50 per cent. at 180°, or horizontal.
20 per cent. at 90°, or vertical.
5 per cent. at 45°, or oblique.
25 per cent. at other points.

Ah. 54 per cent. at 90°, or vertical.
14 per cent. at 180°, or horizontal.
7 per cent. at 135°, or oblique.
25 per cent. at other points.

Table B exhibited—Compound As.:

Am. 33⅓ per cent. at 180°, or horizontal.
25 per cent. at 90°, or vertical.
11 per cent. at 135°, or oblique.
30 per cent. at other points.

Ah. 60 per cent. at 90°, or vertical.
17 per cent. at 180°, or horizontal.
5 per cent. at 45°, or oblique.
18 per cent. at other points.

Table C exhibited—Mixed As.:

Am. 75 per cent. at 180°, or horizontal.
25 per cent. near 180°, or horizontal.

Ah. 92 per cent. between 45° and 135°, vertical.
8 per cent. at 180°, horizontal.

Table D. exhibited General As., all the cases united with As.:

Am., 42 per cent. at 180°, or horizontal.
23 per cent. at 90°, or vertical.
35 per cent. at other points.

Ah., 54 per cent. at 90°, or vertical.
8 per cent. at 180°, or horizontal.
38 per cent. at other points.

Thus, Am. exceeds at 180°, or horizontal.
Ah. exceeds at 90°, or vertical.
Am., 42 per cent. at 180°.
Ah., 54 per cent. at 90°.

As to the eyes in the 365 cases equal and unequal in refraction in degree and axis in O. U. and O. D. and O. S.:

Table E. exhibited—O. U. equal, 56 cases, or 24 per cent. in degree and axis.
O. U. equal, 19 cases, or 6 per cent. in degree.
O. U. equal, 39 cases, or 17 per cent. in axis.
O. U. unequal, 120 cases, or 53 per cent.
O. D. unequal, 120 cases.
O. S. unequal, 120 cases.

Total..... 234
less 9 mixed As.

225

Table E. also exhibited in what degree and axis O. U. were equal; also in what degree; also in what axis.

Table E. also exhibited how, in Compound As., O. U. were equal:

(57 cases in all.)	M ⌒ Am. and axis.....	4 cases.
	M ⌒ Am.....	3 "
	M.....	27 "
	Total.....	34
(57 cases in all.)	H ⌒ Ah. and axis.....	10 cases.
	H ⌒ Ah.....	3 "
	H.....	10 "
	Total.....	23

Compound Myopic As. exceeds.

Table 1 exhibited the order and number of degrees and axis in O. D. and O. S. in the 365 cases in Am. and Ah. compared:

O. D. 85; O. S. 91.

Am., O. D. 39; O. S. 48.
Ah., O. D. 46; O. S. 43.

O. D. exceeds in Ah.
O. S. exceeds in Am.

Table 1 exhibited number of degrees for O. U., O. D. and O. S. in Am. and Ah.:

O. U., Am. and Ah..... 18

O. U., Am..... 16
O. U., Ah 16

Am., O. D. 17; O. S. 20.
Ah., O. D. 21; O. S. 19.

O. D. exceeds for Ah.
O. S. exceeds for Am.

Table 1 also exhibited the number of axis for O. U., O. D., and O. S. in Am. and Ah.:

O. U., Am. and Ah..... 30

O. U., Am..... 24
O. U., Ah..... 20

Am., O. D. 15; O. S. 20.
Ah., O. D. 19; O. S. 17.

O. D. exceeds for Ah.
O. S. exceeds for Am.

In the proportion of Am. 106; Ah. 128.
O. D. 182; O. S. 183.

O. D. is more frequently affected in Ah.
O. S. is more frequently affected in Am.

As existing in O. D. 182, O. S. 183, shows that As. exists almost equally in each eye.

The 103 eyes, or 22 per cent., not counted with the 365 eyes, or 78 per cent., to make up the 450 eyes (or the 225 cases), were thus affected:

With other optical defects..... 86 cases, or 17 per cent.
With injuries and disease..... 17 cases, or 5 per cent.

		O. D.	O. S.
Refraction: E.—O. U. 14,	Am.,	3	2
	Ah.,	4	5
M.—O. U. 13,	Am.,	8	3
	Ah.,	2	0
H.—O. U. 26,	Am.,	2	1
	Ah.,	14	9
Am.—O. U. 7,	Am.,	1	1
	Ah.,	3	2
Ah.—O. U. 3,	Am.,	1	0
	Ah.,	0	2
Compound As.: O. U. 16,	Am.,	2	5
	Ah.,	3	6
Mixed As.: O. U. 7,	Am.,	2	0
	Ah.,	1	4
		O. D.	O. S.
Total.....		46	40 = 86

Diseases and injuries:

		O. D.	O. S.
Opacity Cornea, O. U. 5,	Am.,	3	2
	Ah.,	0	0
Opacity Vitreous, O. U. 2,	Am.,	0	1
	Ah.,	0	1
Opacity Crystalline Lens, O. U. 3,	Am.,	0	2
	Ah.,	1	0
Retinitis, O. U. 1,	Am.,	0	1
	Ah.,	0	0
Injury, O. U. 4,	Am.,	2	1
	Ah.,	0	1
Enucleation, O. U. 2,	Am.,	0	0
	Ah.,	0	2
		O. D.	O. S.
Total		6	11 = 17

The O. D. exceeded in different optical defects.
The O. S. more subject to disease.

Adding the 365 eyes with astigmatic defects,
and the 103 eyes with other defects, etc.,

468 results;
18 deducted for excess in Mixed As.,

450 eyes remain, belonging to
225 cases studied.

I offer the foregoing cases, as a carefully investigated list of astigmatic defects, with their correction and comparison. Does the frequency of the position of the principal emmetropic meridian in myopic astigmatism, at a horizontal position, and that of hypermetropic astigmatism, at a vertical position, help us to elucidate the cause of astigmatism? I would be glad to answer, that it did absolutely. The study of these cases helps to render more plausible, a line of thought that has occurred to me in seeking for the cause of astigmatism. Solving the cause of normal astigmatism will render the abnormal explained—having a relation to emmetropia, it bears the same to ametropia; the tables also show, the same relation in all forms of abnormal astigmatism; M. and H. in compound astigmatism having no effect on its prevalence or position.

The average position of the maximum and minimum of curvature of the cornea in emmetropia or normal astigmatism, giving a shorter focal distance in the vertical than in the horizontal meridian, is fully appreciated; but the reason of this, and why, when it varies from this, is the point, when fully explained, that will give the cause of astigmatism normal and abnormal. The cause that gives the position of the principal emmetropic meridian is the one to solve. The form of astigmatism is to be accounted for by the amount of tissue in an eye, below or above the normal eye, subject to a given influence, the same as decides the form of M. or H. The degree of astigmatism depends on how much the form varies in excess or how much diminished from the normal-tissued eye. The axis depends on what causes astigmatism. Cannot the cause of the difference in the curvature of the meridians of the cornea, making the eye assume an asymmetrical form; normal or abnormal; be sought for, in the relation of the position of the axis of the porous opticus and even the pupil, to the axis of the cornea or ciliary body, with the resultant force expended by the tunica uvea or vasculosa, in its entirety on its point of attachment to the cornea, at the canal of Schlemm? A short anatomical study of two tissues of the eye will help me to explain. One, giving the eye its form; the dural sheath of the nerve, the sclera and cornea as one; the other, the active and passive muscular tissue, the tunica vasculosa, in its entirety of choroid, ciliary body, and iris.

The one tunic, hard and dense giving the eye its form, having its origin in the dura mater of the optic canal, coming forward and expanding itself, according to the underlying tissues, and inserting itself in itself, at the anterior pole of the eye; the weakest point in this tissue being at the porous opticus and the weaker at the canal of Schlemm, or base of cornea.

The other tunic, underlying the one described, having its origin of muscular elements around the porous opticus, and even interlocking through it, forms a sphincter muscle at this point; held in place by the retina and vitreous body as it expands meridionally; till it is attached anteriorly in the canal of Schlemm at the base of the cornea, where another sphincter muscle is formed. Then the tissue falls dependent, unsupported, and inserts itself in itself, in a sphincter muscle, the third in the series, so that the whole tissue is composed of three sphincter muscles, connected by radiating fibres dividing it into two portions, the anterior the smaller, and the posterior the larger.

Now, these three sphincters differ in the position of their axes.

The posterior one lies about four millimetres medially and little below the central one; the central one lies in the axis of the cornea, or nearly so. The anterior lies not centred, but medially and below, like the posterior one. I prefer to consider the axis of the porous opticus and pupil as one, or lying in the same plane, as far as muscular action is concerned, and not crossing the axis of the ciliary body. I believe the same result ensues as if you consider the axis of the porous opticus and the axis of the pupil crossing the corneal axis at their proper positions, or the influence of the anterior sphincter on the central one can be thrown aside; but it is better to be retained. If all these sphincters were around the same axis, and the same muscular force as they possess present, any muscular effort, active or passive, would expend itself equally and evenly around the axis at the weakest or weaker point, and no difference in sphericity would occur. Not lying in the same plane, or around a common axis, an uneven force is exerted, and an uneven or asymmetrical result follows active or passive muscular action. Two axes exist: the central axis of the cornea or ciliary body as one, and the axis of the porous opticus and pupil as the other, so that the hour-glass contraction of the ciliary body pulling in active or passive muscular action on the sphincter on either side, especially the posterior, exerts an uneven force which spends itself on the attachment of the muscular tissue to the cornea or canal of Schlemm, and an elliptical shape is given to the cornea in the normal-tissued eye, by which, in emmetropic vision, normal astigmatism results.

The normal position of the porous opticus in a normal-tissued eye will place the maximum of curvature to coincide with the vertical, and the minimum of curvature of the cornea with the horizontal meridian. When this varies in emmetropia, the position of the porous opticus must vary.

The relation of the position of the axis of the porous opticus and pupil to the axis of the ciliary body or cornea, with the resultant force expended by the tunica uvea or vasculosa on its attachment to the cornea or canal of Schlemm, can be considered as the cause of normal astigmatism.

This tension on the cornea exists in the fœtus in its development, and is constant after birth. In abnormal astigmatism, does not the same hold in reference to the axis; the form and degree, depending on the excess or diminution of tissue, and how much, from what occurs in emmetropia?

In M. and H. the position of the nerve differs from E.—in M.

farther removed, in H. nearer than in E., and does not the same hold good of Am. and Ah.? So that, in the average position of the axis of the disk in Am., emmetropia stands at 180°, or horizontal, and in Ah. at 90°, or vertical; and when this varies, it is due to a variation in the position of the axis of the porous opticus; as the tables show the possibility for all positions of the axis of the lens, correcting the defect in Am. and Ah. A diseased condition of the tissues could produce the same result.

I regret to have no measurements to offer, in reference to the relative position of the axis of the ciliary body or cornea, and the axis of the porous opticus and pupil, to support what I have expressed in reference to the cause of astigmatism. The uniformity exhibited in the tables in all forms of astigmatism, has encouraged me to say what I have, and which the anatomy of the eye helps to support.

REPORT OF A CASE OF TRAUMATIC PARALYSIS OF THE SUPERIOR OBLIQUE MUSCLE, WITH TREATMENT.

By DR. W. S. LITTLE,

PHILADELPHIA, PA.

NOVEMBER 24, 1877, I was requested to examine the eyes of a lady, fifty-seven years of age, who had fallen down-stairs two days before and was found in an unconscious condition at the foot of the stairs, shortly after the accident; she had fallen on the right side of the head and body. Consciousness was rapidly regained: she could give no account of how it occurred; the stairway was dark and turned at right angles half way down, and some dozen steps in all. Some incoherency lasted for a few hours, and the next morning, on awaking, she saw double, and her physician observed the right pupil larger than the left. I saw her the second day, and found the following conditions affecting the eyes, after making a general examination.

There was no paralysis of motion or sensation in the arms or limbs, only soreness on the right side, upon which she had fallen. No deflection of the tongue, no loss of sense of taste or smell, no nausea or vomiting; some headache. The patient was examined while lying in bed; the condition of the eyes was found as follows: pupil

of the right eye partially dilated, about 6 mm.; the left pupil normal, 4 mm. Ophthalmoscope revealed myopia of both eyes, fundus of both eyes normal; field of vision in both eyes full.

Making fixation with both eyes at an object, held in the horizontal median line, the right eye deviated upward and inward slightly; on closing the left eye, the right made a movement downward and outward. Testing the movement of the left eye, found it normal; in the right eye, however, downward and inward, a less mobility; moving from below upward to the nasal side, it gave a jump.

Testing the field of vision with a candle for both eyes, found double vision below the horizontal line, single above it; standing 15 feet from the patient, in the median line, the images below the horizontal line were homonymous—at 10 feet they were 12 inches apart; and one, the right, 3 inches below the other; this one appeared larger and nearer, and inclined outward at the top; as the candle was moved toward the left the difference in height increased, also the inclination. All objects about the room, below the horizontal line, were doubled and obliquely placed, and not overlapping. From the presence of these symptoms, paralysis of the superior oblique of the right eye was diagnosed. The cause was either central, and the patient affected with an apoplexy at the time of the fall; or else, as a result of the fall, the fourth nerve, coming through the sphenoidal fissure, had been injured by pressure between the bones, or an effusion had taken place about the nerve in its course through the orbit, or the muscle had been injured at its origin. Any central cause was excluded from the slight cerebral derangement and absence of distal loss of sensation or motion, and I was inclined to the belief of traumatism of the nerve; it lying uppermost in the fissure, could be injured by pressure from the bones lying on either side of it. The symptoms given by Wells, p. 561, as involving the superior oblique, were all present.

I gave a favorable prognosis as to the cerebral affection, and was requested to endeavor to relieve the double vision, which was very annoying. Ordered potass. iodid., gr. v., t. d.

December 1st.—At 10 feet the images were 9 inches apart, the right 3 inches lower; ordered the potass. iod., grs. x., t. d.

December 8th.—At 10 feet the images were 9 inches apart, the right 4 or 5 inches below and inclined. I kept the right eye covered, so as to avoid the double vision, and advised either wearing a shade or ground glass before the right eye, to which the patient objected, as she felt well and able to go about; and as I had found on my

first visit a prism of 20°, base down and out, centre of apex of prism at 20° united the images, she desired to obtain this prism. The optician, like the books, objected to its utility.

December 19th.—It was obtained; a plain glass used for the left eye, and single vision resulted. The oblique muscles stand the effect of stronger prisms than the recti muscles.

December 25th.—Wearing prism with comfort; still taking the iodide of potassium. Find pupil right eye smaller.

December 29th.—One month and four days after injury, used Faradic current to superior oblique as best I could. Objects that were formerly separated and oblique began to overlap one-quarter, after its use.

January 16, 1878.—Find the right image moved nearly to median line, and then recedes.

January 23d.—Used eserine to bring down pupil, with good effect.

February 8th.—Prism 17° unites candles. She wore with her prism the concave glasses that she had used for years, for distance.

February 21st.—Prism 17°, centre of apex at 20°, obtained, and worn with comfort.

February 23d.—Without prism, saw my face single while I stooped to pick something from the floor; it was only momentary, and double vision ensued again.

February 28th.—After battery, without prism, can hold objects single for five minutes.

March 2d.—Obtained prism 15°, same position.

March 6th.—Without prism, at 3 feet below horizontal line, objects single for five minutes.

March 18th.—Prism 15° annoyed her.

March 24th.—Prism 10° worn.

April 3d.—Without prism, at 20 feet, objects single below horizontal medium line, patient standing, candles on floor, images unite and go off to 3 inches.

April 13th.—Prism 5°, same axis.

April 17th.—Without prism, held object single for long time; constantly single to one foot below horizontal line.

May 8th.—Prism 3° used.

June 11th.—Without prism, patient standing at 40 feet, image single to 3 inches from floor.

June 24th.—Marked improvement at 10 feet in horizontal and medium line, object single; 45° from median line to right, single; 45° from median line to left, 4 inches apart.

September 9th.—At 20 feet, without prism, candle on floor, 1½ inch apart; right 3 inches lower and nearer, and inclined; advised to go without prism, and only use concave glasses; right pupil nearly normal.

September 19th.—At 40 feet, image single, without prism; at 20 feet, 3 inches apart, come and go.

September 27th.—18 inches from floor, 6 feet from patient, images 3 inches apart; sent to sea-side.

October 25th.—Sees single at 20 feet, candle on floor, patient standing, no prism. Renew potass. iodid., which had been stopped for long time.

December 23, 1878.—One year from accident. At 5 feet from patient, single to 28 inches from floor, no prism.

January 6th to January 25, 1879.—Gave strychnia, $\frac{1}{20}$ gr., t. d.; constitutional effect.

March 19th.—Gave full correction for compound myopic astigmatism:

O. D.—8 ⌒—48 cyl. ax. 90° $\frac{20}{xx^{+}}$.

O. S.—8 ⌒—48 cyl. ax. 45° $\frac{20}{xx^{+}}$.

With this correction, objects single, pupil about normal, larger at times; with the slightest inclination of head forward, reads and sews with ease. Uses prism 3° when walking or using eyes for long time.

September 26, 1878.—Works without prism; candle single at 20 feet on floor.

March 17, 1880.—General health good; goes with or without prism 3°. At 17 feet candles come and go slightly, but under control; pupil O. D. slightly larger than O. S.; no treatment; reads and sews without trouble.

I applied the battery one hundred and nine times from December 29, 1877, to December 28, 1879, but principally during 1878.

Took potass. iodid. from December 24, 1877, off and on, for six months, with occasional tonics; used strychnia one year after accident, and pushed till constitutional effect was reached.

The prisms were changed as follows, and six were used, beginning:

December 19, 1878.....	20°	centre	apex, 20°.
February 21, 1878.....	17°	"	"
March 2, 1878.....	15°	"	"
March 24, 1878.....	10°	"	"
April 13, 1878.....	5°	"	"
May 8, 1878.....	3	"	"

I have them with me for your inspection, except the prism of 3°, retained for use by the patient.

The details of treatment, as I have taken them from my note book, may be interesting to you, as the rarity of this muscle being affected gives little opportunity for observation or treatment. Though the paralysis in this case was not permanent, strong prisms could be as well worn in a case where the paralysis was complete.

The dilatation of the pupil was interesting to observe in all its stages. The presence of filaments from the carotid plexus of the sympathetic in the fourth nerve, and its occasional blending with the ophthalmic division of the fifth nerve and its recurrent branch to the lateral sinus, are known to exist, and no doubt these were affected along with the proper filaments of the nerve, and the dilatation ensued. Of course this cannot be absolutely asserted: the restoration of function of the muscle and the contraction of the iris later makes it probable.

REPORT OF A CASE OF PARTIAL PARALYSIS OF THE INFERIOR OBLIQUE, WITH TREATMENT.

By DR. W. S. LITTLE,

PHILADELPHIA, PA.

From inability to procure a proper reading-glass, a lady, fifty years of age, consulted me during September, 1877, stating also, she experienced difficulty with opera-glasses, and never could use a stereoscope as other persons.

O. D. V. $= \frac{20}{xx}$ As. slight; no mydriatic.

O. S. V. $= \frac{20}{xx}$ As. more marked.

Ophthalmoscope revealed the right optic nerve, more whitish than the left.

I ordered a + 12 focal for near work.

September 13, 1879.—Two years subsequently I saw her again, as she had fallen three days in succession, on the street, while crossing the railway tracks, and once came near being run over; she had also fallen at home while coming down-stairs; she discovered that double vision was the cause of her mishaps, and it had increased of late. General health was good, pupils were normal.

Her optical defect was corrected under duboisia, and

O. D. V. = $\frac{20}{20}$ + 48 V. = $\frac{20}{20}$.

O. S. V. = $\frac{20}{20}$ + 42 ⌒ −60 cyl. ax. 45 = $\frac{20}{20}$.

While under the mydriatic and afterward, O. D. A prism of 6°, base upward and outward, with centre of base at 150°, united the double images, and a partial paralysis of the inferior oblique existed. Her falls were always while coming down-stairs or crossing places requiring an inclination of the head, downward and forward.

The position of both eyes was apparently normal; on rotation of the right eye, from above inward, it gave a jump, down and outward.

The diplopia was above the horizontal line and homonymous, the images 6 inches apart, and one, the right, 2 inches higher than the left.

The prism of 6° base upward and outward. Centre of base of prism at 150° united these images placed before the right eye.

A combination of the far and near glasses was used with comfort.

Far: O. D. + 48 ⌒ prism 6° base upward and outward, centre of base at 150°.

O. S. + 42 ⌒ −60 cyl. ax. 45°.

Near: O. D + 10 ⌒ prism 6° base upward and outward, centre of base at 150°.

O. S. + 10 ⌒ −60 cyl. ax. 45°.

I saw the patient lately; she remains dependent on them, and thought she might need a stronger prism, rather than a weaker one.

The cause of the partial paralysis in this case is unaccounted for. There may be some cause of irritation in the orbit, affecting the branch of the third nerve going to the muscle, or the muscle itself irritated, or else a central source of irritation to the cells controlling the filaments of the nerve going to the inferior oblique.

I have seen lately a case having an apoplexy, with diplopia, where a prism of 5° in the same position relieved the diplopia and requiring to be worn for a few days, all the symptoms improving and diplopia disappearing.

The rarity of this nerve being affected has led me to report this case along with that of the affection of the superior oblique.

REMARKS.

Dr. Howe inquired if the effusion would not have something to do with the affection of the muscles.

Dr. Little thought not.

DR. HOWE remarked that he had observed a case of injury in which there was proven to be an effusion in the upper part of the orbit of the eye, and from which the patient recovered without any interference whatever. He thought, in the case reported by the Doctor, that there might have been an affection of the nerve first, and afterward of the muscle.

DR. LITTLE remarked that in his case the improvement took place immediately after the application of electricity.

DR. NOYES reported that three cases in his practice had been relieved at once by operation.

CASES OF LACERATION OF THE EYELIDS.

BY DR. HENRY D. NOYES,

NEW YORK.

A NOT infrequent accident is laceration of the eyelids. Within two years three such cases have come under my notice, and I report them because I have found that a certain method must be adopted to get the best results in healing. The points to be observed will be alluded to in narrating the cases.

CASE I.—February, 1877. A boy 19 months old, while playing about the floor, got possession of a hook used to button shoes, pushed it under the upper lid of his left eye, and tore away the lid from its attachment at the inner canthus. I was called to the case within an hour, and found a laceration beginning on the nasal side of the punctum and running upward and outward along the supra-tarsal fold for three fifths the length of the upper lid. The bleeding had stopped and the flap hung down over the cornea.

I put the child under chloroform, and brought the parts together in the following way: inasmuch as the tarsus had been detached, I saw the necessity of bringing it into proper apposition. To this end I carried a silk suture through its upper edge, at about the middle of the laceration, in the form of a loop, through the entire thickness of the lid at the fornix, and brought both its ends out on the skin at adjacent points, and tied them over a little roll of muslin. The suture had a needle at each end, which was held by needle-forceps. The performance of this step was the critical point in the whole pro-

ceeding. It drew up the tarsus as by a sling to its proper relation at the fornix. Afterward the external wound was united by several fine interrupted silk sutures and the skin put into perfect coaptation. Slips of isinglass-plaster were laid over the lid, a pad of cotton and a bandage applied. The needles were small and those used at the inner canthus were semicircular.

On the sixth day all the sutures had been taken out, and by the tenth day the eye needed no further attention. The line of cicatrix is now almost invisible, the appearance is perfectly natural, and the command of the lid is complete.

The suggestion to be made in this case is the importance of uniting the mucous membrane and tarsus before the wound of the skin is closed, and in this very young subject the sling suture was the most suitable, both for its effectiveness and because it could be easily withdrawn.

CASE II.—Man aged forty, living in New Jersey. In attempting to move a horse-rake which was placed with the shafts turned up against a barn, a hook caught his left upper lid and tore it from its orbital attachment for about half its length from the inner canthus to the middle of the brow. The globe was not hurt. A physician of the neighborhood put sutures into the skin, and made a rough coaptation. External union took place, but the inner canthus was not restored and the tarsus had not been united. In course of time cicatrization of the under surface was accomplished, and ectropium began. Gradually this deformity increased, and the exposed conjunctiva underwent the usual florid papillary hypertrophy; the cornea became inflamed, hazy, and vascular. About five months elapsed before I saw him, when he not only presented a disagreeable deformity, but suffered from lachrymation, photophobia, pain, and dimness of sight. By passing my finger beneath the lid, up toward the fornix, I recognized a dense cicatricial ridge which corresponded to the outer wound. Evidently this hard tissue was the cause of the ectropium, both by its contraction and by the barrier which it formed to the return circulation of the veins and lymphatics.

The man was put under ether, and the cicatrix was cut out along its entire length, thereby reproducing almost perfectly the condition at the first injury—giving a loose flap, which was to be re-established in correct relations. Anticipating considerable retraction, I aimed to carry the inner end of the flap, beyond the inner canthus.

I not only excised the old cicatricial tissue at this point, but cut out an open angle of healthy skin, into which the point of the flap was to be thrust and held by sutures. The manœuvre was difficult because the small curved needles had to be directed up the acclivity of the nasal bones, and to bring out their points without breaking them was troublesome.

This was not, however, the first step. A careful coaptation of the tarsal edges and mucous membrane was made by three stitches, which were applied to the everted flap and left in situ in the fornix, when the flap should be ready for adjustment to its proper place, and for the application of stitches to its cutaneous surface. Then the preparation of the inner angle, as above mentioned, was made, and the necessary interrupted stitches introduced. These were supported by a fine insect pin (harelip suture) at the inner angle. Before replacing the everted lid some of the hypertrophied conjunctiva was excised. A bandage was applied and retained for twenty-four hours. Cold-water dressings were used, and about the tenth day the patient went home. During the year I have seen him several times, and at the last visit the eye was entirely comfortable, the cornea clear, the conjunctiva healthy, the lid in position, and its movements normal. It could be lifted to the proper degree, and the line of cicatrix was inconspicuous. The inner canthus had by retraction come to be of correct shape.

CASE III.—An injury of far greater extent and severity is now to be related, in which the probable total severance of the levator palpebræ and of much of the skin, coupled with fracture of the orbital bones, made it impossible to effect complete restoration of the parts. The case has interesting features aside from the damage to the lids. For the notes I am indebted to Dr. Oppenheimer, house surgeon of the New York Eye and Ear Infirmary.

Charles H., aged seventeen, about a year and a half ago was trying to force his way through a crowd in Washington market, and, to slip between persons who were carrying burdens on their shoulders and baskets on their arms, dodged his head down and struck against a stationary hook used for hanging meat. It penetrated the inner and upper corner of the orbit, lacerated the soft parts, and fractured the roof of the orbit. He was thrown down insensible, and taken to the New York Hospital, where he remained six weeks. After this time he came to me as an out-patient at the New York Eye and Ear Infirmary. There was total eversion of the upper lid, the conjunctiva enormously thickened, the eyeball deviated to the inner

canthus strongly, with no power to turn it out. A deep notch could be felt with the finger about the middle of the superior orbital margin, indicating where the bone had been fractured, and the history of its residence in the hospital implied that he had had meningitis. The pupil was normal, the eyeball seemingly uninjured, but by the ophthalmoscope the optic nerve was found in a state of marked atrophy, presumably the stage succeeding severe neuritis. The very oblique position of the eye made examination of sight almost impracticable, but a low degree could be ascertained. The cornea was covered, notwithstanding the eversion of the upper lid, because all its tissues were so œdematous and thick. The everted lid border could be turned down, but would slowly return to its unnatural situation. It was evident that a long time must be allowed for reduction of the swollen lid to a normal state. I simply directed the continuous use of a pressure-bandage, applied as tightly as could be borne, and removed only so often as cleanliness required. After about a year the upper lid was thin enough to hang without eversion, but it could not be lifted, and there was a deep notch at its inner and outer angles, and from the inner angle a cicatrix ran along beneath the brow, almost to the external orbital border. An improvement in sight had occurred, so that upon the outer part of the field he could see movements of the hand.

February 1, 1879, patient was etherized, and I attempted to bring the eyeball to the middle of the palpebral slit, and hoped something might be done to help the upper lid. I proposed to release the adhesions of the eye at the inner canthus, and to attempt to find the distal end of the torn-off rectus externus, and give it a new attachment to the globe. Extensive dissection was made at the inner canthus, by which not only was the insertion of the rectus loosened, but the surrounding connective tissue freely cut. There was abundant cicatricial substance here, and parts were firmly condensed together. Having done all that seemed appropriate on this side, I next began upon the outer part of the globe to search for the rectus externus. Its stump was found, but when an effort was made to turn the globe outward to meet it, no rotation could be effected. Puzzled by this unlooked-for state of affairs, I could not find any explanation at the inner canthus, and gradually worked my way at the outer canthus backward to the deep part of the orbit. I soon found that there had been fracture of the external wall, and pushing in with finger and scissors I at length came upon a spot where the posterior part of the globe had become united to the

periosteum. Keeping close to the bony wall and using a strong pair of blunt-pointed scissors, curved on the flat and holding their convex surface against the globe, I succeeded, bit by bit, in clipping away these attachments and rendering the eye movable. I had by this time arrived almost at the orbital apex. The eye could now be lifted forward about 4 mm., and rotated outward a little beyond the median line of the orbit. Examination of the upper lid showed that a dense cicatricial band separated the superior fornix from the parts below, like an hour-glass contraction, and that a considerable space existed above, which could be reached with some difficulty by forcing the finger between the cicatrix and the globe. No effort was made to improve the state of the lid, but the conjunctival wounds were closed after the external rectus had been brought into the best attainable position by sutures. It was not expected that the eye would be made mobile, but a more natural, permanent position was sought for.

The ensuing reaction was rather severe, but the parts healed well. Exophthalmus was caused, but subsided, and the patient went home in two weeks.

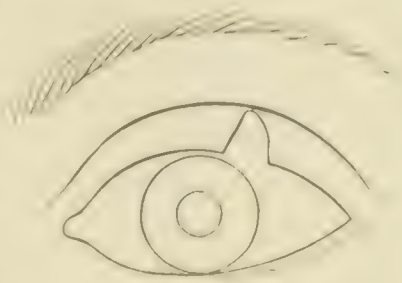
At the last view of his condition, the upper lid had drawn up somewhat, but was helpless in ptosis: the eyeball was in correct position.

Whether any greater improvement is possible is very doubtful. The separation of the levator was complete, and the fracture of the upper plate of the orbit must have matted the tissues together so as to hold the remainder of the muscle in perfect bondage. Excision of a piece of skin would merely reproduce ectropium, and incision or excision of the scar would cause uncertain and possibly disadvantageous results.

Since the meeting of the society I have seen the case, and find that retraction has taken place in the upper lid, but not enough to uncover the cornea. The skin hangs perfectly smooth, without wrinkles to indicate action of the orbicularis or of the levator. When he forcibly closes the lids the upper does not descend, and corrugates only through the communicated action of the orbicular fibres of the lower lid. Considerable conjunctival thickening exists, and its treatment is the present indication. The globe remains fixed upon the middle of the orbit, has no motion to the right or left, and slight movement up and down.

Congenital fissure of the upper eyelid.—Katie D., aged seven

months, was brought to me by Dr. Nolden, in May, 1870. There was a cleft near the middle of the right upper lid, running through the tarsus, and looking like the accompanying diagram. This was congenital. I pared the edges, and attempted to avoid any notching of the tarsal edge by hollowing out the sides of the fissure and causing the tarsal end of the line of junction to protrude in a nipple under the pressure of the sutures. Harelip sutures with fine insect pins were used, and while union was obtained, the subsequent retraction of the scar gave rise to a small notch.



Before the operation the cornea was to be seen through the fissure, but afterward the eye was satisfactorily covered.

GLIOMA OF BOTH EYES—REMOVAL—RECURRENCE—DEATH—AUTOPSY.

By DR. HENRY D. NOYES,

NEW YORK.

The case to be reported was presented to the New York Pathological Society when the specimens were fresh. Further details of the microscopic examination of the brain are now supplied.

In November, 1878, a very fat boy of Jewish parents, about one year old, was brought to me at the New York Eye and Ear Infirmary. The father stated that when he was six months old a glistening reflex was noticed in the left eye. He did not know at what period something similar appeared in the right eye. It was found that the vitreous space of each eye was occupied by a yellowish white growth, which in the left was distinctly vascular and pressed upon the crystalline; in the right eye the growth was not so large, but was distinctly visible. In view of somewhat retarding the deeper development of the disease and to anticipate the probable speedy extension outside of the eyeball, enucleation of the left was advised.

The case disappeared from observation until January, 1880, when

I learned that the parents found means to go to Germany in the preceding August, and took the child to Prof. Förster, of Breslau, who advised and performed enucleation of the left eye. For some months the orbit continued healthy, but when the child was presented to me the left orbit was filled by a secondary growth, which had been noticed for three weeks. It protruded between the lids, and had a fleshy look and firm feel. Under ether the growth was removed with little difficulty and with little bleeding. It was detached from the orbital walls chiefly by the finger and the closed scissors used as a spatula. At the apex it was unavoidable to leave a mass of substance, similar to the tumor, adherent to the foramina. The growth was about the size of a small hen's egg. The child made a good recovery in about six weeks. For three weeks more relief continued, when a fresh growth appeared in the orbit, and was accompanied by severe pain in the temporal and frontal regions, and by frequent vomiting. It was evident that the disease had extended to the brain, and no further operation was to be entertained. The other eye had meanwhile been exhibiting an increase in the deposit, but its advance was not rapid. Opiates were administered and other palliative measures employed, but death occurred March 18, 1880.

An autopsy twelve hours after. In removing the calvarium numerous adhesions were found between the dura and pia, chiefly along the longitudinal sinus, and on either side of it for its entire length. The brain was excessively soft, and its removal was difficult. On turning up the base, the substance was almost like custard in softness, and it was impossible to preserve its integrity. The optic nerves were divided near the commissure, and the brain put at once in Müller's fluid. The roof of each orbit was chiselled away and the contents removed.

The secondary growth in the left orbit caused the lids to bulge forward, filled the entire cavity, had caused absorption of the greater wing of the sphenoid, and left only the thickened dura mater intervening between it and the brain.

The right eye was opened and found to be almost wholly appropriated by the tumor, which had appeared in the iris and also reached back into the optic nerve. It was necessary to leave the specimens for six weeks in Müller's fluid before they would permit examination.

The following careful report has been prepared by Dr. James L. Minor, and is as perfect as the condition of the specimens would permit. The excessively soft state of the brain was clearly due to inflammatory changes mingled with the gliomatous infiltration.

REPORT ON SPECIMENS, BY DR. J. L. MINOR.

The specimens, after hardening in Müller's fluid, presented the following appearances: the orbital tumor is an irregular conical mass, about 5 ctm. from base to apex, and 3 ctm. in diameter at its base. Right eye externally normal, and was divided meridionally from cornea to optic nerve. The anterior chamber is present, but encroached upon by a bulging forward of the iris and crystalline lens, the latter being dislocated downward and outward by a neoplasm filling the vitreous chamber so completely as to prevent its starting-points from being ascertained. The optic nerve remaining attached to the globe is about 2.5 ctm. in length, and is slightly enlarged at its entrance into the eye. The brain is very soft and breaks down easily. The pia mater is thickened, and in many places presents a granular appearance. Microscopic examination: the orbital tumor is built up of the characteristic gliomatous structure, numerous small round cells, a scanty supply of delicate connective tissue, and fine blood-vessels, with a small quantity of a homogeneous matrix.

The eye presents the following conditions: cornea normal; the iris and ciliary body both infiltrated with gliomatous cells. The intra-ocular growth is composed of the same material that is found in the orbital tumor. The retina is implicated to such an extent by the gliomatous infiltration that its intimate structure cannot be studied. The choroid presents the same infiltration in a less marked degree, while the sclera is not entirely free. Sections of the optic nerve, made at various points from the lamina cribrosa to its extremity, showed the same cell-infiltration as found in other parts. The whole nerve is involved, and its sheaths also. In the brain the pia mater is the structure chiefly involved, and this is the case throughout its whole extent. In places it is 6 mm. thick, and composed almost entirely of glioma-cells. The cell-infiltration extends into the cortical matter in certain localities, but the white substance is not implicated. A peculiar feature observed in the brain-section is the presence of numerous large cells, some of which contain granular matter, others are nucleated or multinucleated, while some contain smaller cells in their interior, resembling the glioma-cells. In one instance the number of these small cells in the mother-cell was eight.

It is to be regretted that in all of the specimens examined the gliomatous infiltration was so extensive, for the normal relation of

the tissues was thus disguised to such an extent as to preclude a satisfactory examination of the changes incident upon this disturbance.

The intra-cranial portions of the optic nerves, chiasm and tracts, could not be found, owing to the mutilated condition of the brain. The brain was so soft that it broke to pieces when handled. This condition rendered topographical examination impossible.

REMARKS.

DR. AGNEW wished to say a few words upon the case of coloboma. He exhibited a photograph showing the appearance of a case in which he had operated some time ago. There was a rectangular deficiency of about one third of the horizontal length of the lid; the skin ran over and behind the edges of the coloboma. The incision was carried so as to lift up in the flap the three sides of the coloboma. Having secured a sufficiency of flap, he everted the lid and stitched first what could be found at the tarsal cartilages, including the conjunctiva, and bringing the edges together, finally stitched the skin. The doctor continued his remarks, stating that in the Transactions of this society for 1875, p. 349, he had recorded a case of glioma, and that Dr. Eno had made a concurrent report of the microscopical appearances. The subject of that double operation, whose photograph he showed, was still alive, being seven years old. The first eye was enucleated on May 5, 1874, the child being thirteen months of age. The right eye was enucleated on November 30th of the same year. It should be remembered that the disease was traced into both optic nerves.

ON KERATITIS FROM MALARIAL FEVER.

BY DR. CHARLES J. KIPP,

NEWARK, N. J.

JUDGING from the large number of cases of this affection which have come under my observation, it is of frequent occurrence. It is commonly developed within a few days after an attack of intermittent fever, often simultaneously with the appearance of herpetic vesicles on the nose or lips. In some of my patients every fresh attack of the fever was followed by this corneal affection. In the great majority of the cases that I have seen, only one eye was affected.

If the eye is examined shortly after the first symptoms of irritation are noticed by the patient, one or two or more slightly raised, irregular, opaque lines of varying length will be found on different parts of the surface of the cornea. At the same time some circumcorneal injection will be present. On the following day these opaque lines have increased somewhat in length, whilst at the same time the middle portion of the opacity has been transformed into a shallow ulcer. Under favorable circumstances no further increase in size takes place, the remaining opaque epithelium is thrown off, and reparation begins, to be completed only after several weeks. But not unfrequently the ulcer continues for days, and even weeks, to grow slowly in length, and at the same time sends out club-shaped, slightly raised, grayish offshoots from its sides. In some of my cases the ulcer crept across the entire cornea, and, in a few others, in which several ulcers appeared simultaneously on different parts of the cornea, nearly the whole epithelial layer was eventually destroyed. As a rule, the ulcer shows no tendency to increase much in depth, and its floor and edges, although always of a bluish gray tint, are rarely opaque. The middle and inner layers of the cornea generally remain transparent throughout, but in neglected or maltreated cases an extensive star-shaped opacity of a slightly yellowish gray tint is sometimes developed in the inner layers of the central part of the cornea. A hypopion is but rarely seen, even in the severest cases, and spontaneous perforation of the cornea did not occur in any of

my cases. More or less hyperæmia of the iris is not unfrequently present. Circum-corneal injection was only rarely absent, but in no case was the injection accompanied by much swelling of the conjunctiva. A decrease of the tension of the eyeball, or a diminution in the sensibility of the cornea, could not be demonstrated in any of the cases. The development and growth of the ulcer was always accompanied by very severe pain in and around the eye, and by photophobia and lachrymation. The process of repair was, in all cases, extremely slow, two to four months being generally required for its completion.

Of the various local remedies which I have used in this affection, none have afforded greater relief than the pressure-bandage, warm fomentations, and the sulphate of atropia. In addition to the local treatment I have always prescribed quinia and iron in large doses, and during the last two years I have given arsenic, generally in the form of Fowler's solution, in medium doses, in many cases with very beneficial results. In cases where the pain was great I have never hesitated to give morphium in sufficient quantity to give relief.

The disease here described is not unlike the corneal affection observed by Horner ("Sitzungsbericht der Ophthalmologischen Gesellschaft im Jahre 1871," p. 325) as occurring simultaneously with herpes nasalis in individuals suffering from severe catarrhal affections of the respiratory organs. It differs from the latter, however, in this, that, instead of transparent vesicles, small, opaque elevations, not unlike minute phlyctenulæ, arranged in lines, are developed in the initial stage of the disease. The decided tendency of the ulcer to spread, observed in my cases, was not noticed in Horner's cases.

The only reference to keratitis from intermittens, which I have been able to find in the literature at my disposal, is by O. Becker ("Graefe und Saemisch's Handbuch d. Augenheilkunde," Vol. V., p. 350), as follows: "It is also said that at times, after the eye had been bandaged for a few days, the epithelial layer of the cornea became suddenly cracked and was thrown off in large patches, but was completely regenerated in a few days. This description corresponds closely to the rare and very painful keratitis, following intermittens, which has been described by the older writers, but is totally ignored in modern literature." My efforts to find a description of this form of keratitis in the older works on eye diseases have been fruitless.

REMARKS.

DR. NOYES inquired of Dr. Kipp if he had made inquiries in reference to the occurrence of supra-orbital neuralgia, or anæsthesia of the cornea.

DR. KIPP replied that in his cases there was severe neuralgia, but, so far as noticed, no anæsthesia of the cornea.

DR. NOYES thought that anæsthesia of the cornea occurred more frequently than Dr. Kipp's observations would lead one to suppose. He had often seen it in herpes ophthalmicus.

A CASE OF ONE-SIDED COMPLETE BLINDNESS FROM ISCHÆMIA RETINÆ, ENDING IN PERFECT RECOVERY.

BY DR. H. KNAPP,

NEW YORK.

ON May 28, 1880, I was consulted by Miss Laura M., thirty years old, of New York, giving the following history: She had been well and strong until lately. Her father had a severe illness, which during the last seven months required constant care and night-nursing, all devolving upon her and her younger sister. He died a few weeks ago. She grieved very much, and during his illness had fallen from flesh and become feeble and pale. Occasionally she had noticed flashes of light and scintillation in the left eye. Five days ago she noticed that, without any assignable cause, the sight of the left eye was obscured from above downward, so that in the course of several minutes complete darkness occupied the upper half of her visual field. This had lasted unchanged four days, when, yesterday, the lower half was as suddenly and completely obscured as the upper. She had no pain, felt no uneasiness in any part of her body, but could not see a ray of light with the left eye.

On examination I found the external appearance and motions of both eyes equal and normal, with the exception of the pupils. The right pupil was small and moved briskly on changes of light. The left pupil was over medium size, and, on changes of light, did not move at all. When both eyes were left open, and the right shaded, both pupils dilated promptly, and contracted just as readily when

the right was exposed to the light: but when the left eye alone was shaded, or exposed to the light, both pupils remained completely unchanged. This behavior of the pupil dispelled at once my suspicion of simulation and the use of atropia. Several tests for simulation, which I nevertheless instituted, proved clearly negative. Tn. Visual field complete in both eyes. Media clear. The optic disks looked abnormally pale, and both arteries and veins were smaller and less numerous than usual. Firm pressure on the globe produced arterial pulsation. No other abnormities were found in the eyes.

The patient was neither nervous nor hysterical, and all her functions were in perfect order. I may still mention that her family physician had employed electricity to the eye without any effect.

My diagnosis was: insufficient nutrition of both retinæ, which in the left eye had been of such a degree as completely to suspend the visual function. I ordered her lactate of iron, 0.05 gramme three times daily, generous diet and milk-punch, and told her to pass two hours of the morning and two hours of the afternoon in Central Park, which at that time presented the most luxuriant foliage. In the evening of the same day she could distinguish light and dark. Her sight returned from above downward, just as she had lost it, and grew a little better every day.

June 1st.—Four days later she presented herself again. Her left pupil moved slowly. She counted fingers excentrically in the upper half of her visual field. Fundus as before.

June 4th.—Condition still improved, only in the lower part of fundus no perception of light.

June 19th.—S. $\frac{20}{50}$; F. complete; pupil somewhat wider than on the other side; movable.

July 10th.—S. $\frac{20}{20}$; F. complete: pupil normal. She reads 0.25 at 5 inches. Her optic disks are still abnormally pale, but less so than at the beginning of the treatment; and though the largest vessels are still rather small, a pinkish hue of the area of both disks indicates a better filling of the capillaries, which, when present all over the retina, as I may reasonably expect it was, fully accounts for the return of nutrition and function. If you ask me how I explain the existence of complete blindness in one and perfect light in the other eye, when the same supposed cause acted alike on both eyes, and the ophthalmoscopic condition in both eyes was also the same, I can offer no satisfactory answer, but may remind you of the well-known fact that after cerebral or other disease both optic disks may look alike and markedly atrophic, whereas the functional examinations

prove the vision in one eye abolished, in the other normal. For the explanation of such cases we have to look more deeply than at the head of the optic nerves.

Mr. President and gentlemen, I do not recollect having met, in my practice, with exactly a similar case, and therefore I wanted to place it on record without any further comment.

REMARKS.

DR. NOYES inquired if Dr. Knapp had tried nitrite of amyl in cases of ischæmia of the retina?

DR. KNAPP replied that he had, but without result.

DR. S. BULLER, of Montreal, Canada, remarked that he had used nitrite of amyl, and thought it was of advantage in ischæmia of the retina.

DR. WEBSTER remarked that, in regard to the treatment of these cases by nitrite of amyl, he would say experiments had shown that it was better to give nitrite of potassium.

There being no further remarks, Dr. Knapp proceeded to read his second paper, entitled, "Eight Cases of Sclerotomy for Glaucoma."

EIGHT SCLEROTOMIES FOR GLAUCOMA.

BY DR. H. KNAPP,

NEW YORK.

I DO not know, Mr. President and gentlemen, how far the operation of sclerotomy for glaucoma has found favor in this country. The practical and critical papers of Mauthner and Schnabel, published in the *Archives of Ophthalmology and Otology* during the last years, seemed to inspire us with confidence in this operation, if the recommendations of its originator, Quaglino, and early cultivators, De Wecker, Bader, and others, did not at once conquer our reluctance to abandon in its favor an operation which had given the most satisfactory results. I, for one, have followed the history of sclerotomy with great interest, yet such is my conservative spirit and my pious veneration of the immortal inventor of the glaucoma iridectomy that it required the repetition of cases of so-called malignant glaucoma to impel me to make some cautious attempts at the new operation. As the results thus far have not been discouraging, I will

state my experience before the society in briefly sketching the seven cases (eight eyes) of glaucoma which I have operated upon by sclerotomy.

CASE I.—Mrs. F. F., Jewess, aged fifty-three, presented herself at my clinique, September 10, 1879. Her left eye had absolute glaucoma with a deep excavation; her right, inflammatory glaucoma for several weeks, $+T_2$. Faint perception of light; media turbid; fundus not visible. For personal reasons she was refused treatment, and advised to go at once to some other eye hospital. Three weeks later she returned, unoperated, and materially in the same condition. She and her husband begged so much, that I admitted them to the New York Ophthalmic and Aural Institute, and October 4th performed sclerotomy on both eyes, after previous instillations of eserine. The tension in both eyes had been $+T_2$. The operations were made with a v. Graefe's knife, very peripherically. Immediately afterward the pupil in each eye was drawn upward, and has remained so, in spite of continued instillations of eserine. There was no prolapse of iris, nor a visible incarceration. The healing was smooth. Tn in both; remained normal in right, but rose to $+T_1$ in left eye. The media of the right eye cleared up. S. R. $\frac{1}{\infty}$ as before, L. o. Some months later, Tn in both. R. opt. disk whitish, not excavated. L. as before. S. o. in both.

CASE II.—Mr. Henry Van S., Dutch, aged sixty, consulted me, March 1, 1880, having noticed a gradual decline of sight for a year. He had S. R. $\frac{20}{200}$, L. $\frac{20}{70}$. Corneæ, anterior chambers, irides normal, pupils small, promptly movable. R. +T? L. Tn. Excavation with atrophy, marked, in both. F., equal in both, very much contracted, from point of fixation 1″ or 2″ outward, when tested at a distance of 1′.

March 2d I performed sclerotomy on the right, iridectomy on the left—the better eye—both without accident. Recovery in both undisturbed. Result when last seen, May 20, 1880: S. R. $\frac{20}{100}$, L. $\frac{30}{200}$. Tn in both. The right eye has a central movable pupil, the left has a large, clear, peripheric coloboma, the remnant of pupil moving well. After the operation the sight in the right eye has steadily improved, that in the left steadily diminished. With cylindrical glasses no improvement in either. The field of vision in the left eye has remained as it was before the operation; in the right it had expanded to about twice its previous diameter. The atrophic appearance of the disk remained more marked in the right than in the left eye, and

the depth of the excavation, determined in the erect image, was 1.13 mm. in the right, and 0.94 mm. in the left eye. The tension in both eyes was never appreciably increased.

CASE III.—E. B., aged nine, of German nationality, of New York. One-sided megalophthalmus congenitus, with excavation of od. and increased tension; S.=o. Other eye healthy. As the enlargement in the first was still progressive, I made an upward sclerotomy, which healed nicely with a central round pupil. Eserine was instilled before and after the operation. The tension was at first reduced, later normal. During the next six weeks, as long as patient was under observation, the tension varied between the normal and slight increase; the latter condition, however, being more frequent and lasting. The size of the globe seemed to be unchanged.

CASE IV.—Mrs. A. M., a Jewess, aged fifty-four, had an acute attack of glaucoma six weeks before she presented herself, for which an operation had been advised, but refused. On admission, $+T_2$; ant. chamber shallow; pupil wide. S.=o. Great pain, not materially relieved by eserine.

March 30, 1880, upward sclerotomy, somewhat difficult of execution on account of shallowness of ant. chamber. The tension was reduced after the operation, but some synechiæ formed on the lower edge of the pupil, probably from the use of eserine. Three weeks later the central pupil was somewhat irregular; a beginning of a cystoid scar showed itself at the inner part of the wound, near the vertical meridian; the tension was again moderately increased, but no pain was present. S.=o.

CASE V.—Mrs. A. C., aged sixty-five. Painful glaucoma after being struck on the eye eleven weeks previously. $+T_2$. Pupil very large; immovable, disk dimly seen; not excavated. S.=o. May 1, 1880. Upward extensive sclerotomy. No reaction. +T? S.=o. No pain.

CASE VI.—Mrs. C. P., American, aged fifty-six, presented herself June 25, 1880. Inflammatory glaucomatous attacks, with halos, and very gradual impairment of sight, in the left eye for four, in the right for two years. On admission both pupils were wide and immovable; lens diffusely opaque; $+T_2$ each. S. L.=o., R.=$\frac{1}{200}$. F. R. contracted inward to point of fixation, above and below in a line curving outward from point of fixation like an ellipse. L. od., complete atrophy and deep excavation. R., excavation, marked arterial pulsation.

Admitted to hospital June 26, 1880. Leeches to temple and

eserine did not reduce the eyeball tension nor make the pupil narrower.

June 27th.—Sclerotomy upward, leaving the pupil round. Eserine in evening and morning; no influence on pupil.

June 29th.—Pupil smaller in both eyes; neuralgia disappeared.

June 30th, 9 A.M.—Pupil R. less than medium size. Counts fingers well. In the afternoon the pupil was found pear-shaped and a part of the iris lay in the inner part of the scleral wound. The anterior chamber was of almost normal depth. Patient was not aware that anything happened to her eye, nor could she assign any cause for the displacement of the pupil. She had lain in bed, quietly on her back, the whole day. As soon as I had noticed the displacement of the iris I decided to perform iridectomy at once by excising the incarcerating portion. In this attempt I was surprised by an occurrence which, under similar circumstances, it may be well to remember. I split the conjunctiva and episclera over the black patch of iris in the wound, with a v. Graefe's knife, without wounding the iris. The aqueous escaped and at the same time the iris receded into the anterior chamber. I introduced a blunt spatula into the anterior chamber, smoothed the iris gently and in such a way that the pupil became central, round, and narrow. As, after withdrawal of the spatula and passing the lids over the cornea and sclerotic, no displacement of the iris was visible, I instilled a drop of eserine into the eye and bandaged it. The further progress of the recovery was undisturbed. The wound closed perfectly. The pupil remained round. Tn. S. $\frac{10}{200}$. Discharged July 9th.

July 15th.—Seen again. F. and S. the same. T. not appreciably increased, but arterial pulsation again present, though not so marked as before the operation.

July 19th.—No arterial pulsation. Tn. S. $\frac{10}{200}$. Feels comfortable, and thinks she sees better.

CASE VII.—Mr. J. F., Jew, aged seventy-three. R. operated on for glaucoma seventeen years ago by a New York ophthalmic surgeon. Sight said to have rapidly failed after the operation. On admission, large outward coloboma, with columns adherent to thickened cicatrix. L. pupil less than medium size; sluggish; $+T_1$; iris dirty brown. S. $\frac{3}{10}$, E. F. elliptical from point of fixation outward, with a great axis of 15°.

The patient was exceedingly diffident, yet the decline of sight in his left eye had been so marked in the last three months that he felt he was on the way to blindness. Considering his age and the un-

fortunate result, I advised him to have a sclerotomy made, which I would undertake as less risky than an iridectomy, provided he would give me discretionary power to make iridectomy in case prolapse of iris should occur during or after the operation. He and his family consenting to that, I performed sclerotomy July 15th, thrusting a narrow bladed knife through the upper peripheric part of the anterior chamber, the extent of puncture and counter-puncture being 6''. In cutting the sclerotic and letting the aqueous slowly out, the pupil enlarged upward, with no tendency to contract by turning the knife on its axis. As soon as the knife was withdrawn, the iris prolapsed in the outer part of the wound. Instillation of eserine, closure of the lids, rubbing, reduction with a blunt spatula, opening the conjunctival bridge as in the previous case, and a renewed attempt at reduction with a blunt spatula, all failed. I therefore exsected the prolapse, making a clean, though small iridectomy, taking great care to remove the iris out of the wound. The pupil occluded by blood. He had pain for the first three nights. On the fourth day the pupil began to clear up, and the anterior chamber to fill again. The tension after the operation has been normal, and the resident surgeon writes me that the eye is doing well. The patient was seen again in January, 1880. S. and F. as before the operation.

Mr. President, I beg to make some comprehensive remarks on these cases:

1. The *mode of operation* was essentially that recommended by *Wecker* and *Mauthner*, using a v. Graefe's knife, making the distance between puncture and counter-puncture five or six lines long, and dividing the sclero-corneal juncture as deeply in the sinus of the anterior chamber as the position of the iris would permit. In every case a small scleral bridge was left in the centre, yet so thin that the blade of the knife shone through, as in making a microscopic section. The aqueous was let out slowly, in order to prevent a prolapse of iris, if possible.

2. *Accidents.*—In the first two operations the pupil was oval, the iris being slightly drawn toward the wound, yet without visible incarceration or adhesion. In Case VI. prolapse occurred spontaneously on the fourth day, but reduced itself when the aqueous escaped, after the conjunctiva over the prolapse had been cut. In Case VII. prolapse occurred during the operation, proved irreducible, and the protruding iris was exsected.

3. *Operative results.*—In all cases the tension was reduced in

the first weeks after the operation; but in some of them increased again later, without, however, reaching its former height. Pain and the other inflammatory symptoms, where they had been present, disappeared.

4. *Visual results.*—In the five eyes with absolute glaucoma, no degree of sight, of course, was restored. In one case of chronic glaucoma (Case VI.) the vision, thus far (three weeks after the operation), is as good as before. Patient seen in November, 1879. Her sight has remained the same. The last case does not count, since sclerotomy was combined with iridectomy, and was operated on only a week ago. The second case furnishes a good success in the eye operated on by sclerotomy, especially when contrasted with the failure of iridectomy on the fellow eye: in the former, some improvement of sight and enlargement of the field of vision; in the latter, gradual decay of sight. Both eyes were as much under the same conditions as possible.

Mr. President and gentlemen, I do not presume to draw any conclusions of importance from so small a number of operations. As far as they go they confirm the statements of Mauthner in his exhaustive and very suggestive papers on this subject—"Glaucoma Aphorisms"—published in the *Archives of Ophthalmology and Otology*, Vol. VII., p. 179, etc., and Vol. VIII., p. 25, etc. My own views as to the indications of sclerotomy are as follows:

1. In cases of simple chronic glaucoma with a narrow field of vision and marked excavation, I would prefer sclerotomy to iridectomy, and if both eyes are affected, operate on one at least by sclerotomy.

2. In megagophthalmus (buphthalmus) congenitus I would only perform sclerotomy, since in such cases iridectomy is almost always fatal to the eye.

3. In glaucoma of younger persons, *i.e.*, below thirty-five years of age, and in cases of hemorrhagic glaucoma, I would prefer sclerotomy to iridectomy, since the results of the latter operation in these cases are mostly unfavorable.

4. Encouraged by the experience derived from the above related operations, and on the strength of the statements of Wecker, Mauthner, and others, I consider it legitimate to try sclerotomy also in cases of acute glaucoma. If it prove equally curative as iridectomy, it will have a decided advantage over this operation by leaving the pupil round, small, and central.

REMARKS.

DR. NOYES remarked that his experience in sclerotomy for glaucoma was limited to a single case. It occurred in the person of a young woman under twenty years of age, who came to him in December last, having a subacute attack of glaucoma which passed into a chronic condition. She had a complete picture of glaucoma, and the eye was painful. She was told that an operation alone could afford her relief. She refused to submit to this for ten days, but finally consented, and sclerotomy was done. The effect of the operation was to relieve the pain and to reduce the tension to the normal. The pupil continued circular, and the eye, for a period of some weeks, remained normal. The tension became increased, and the other eye, which had been sound, broke out with an attack of acute glaucoma. Dr. Noyes feared to risk the operation of sclerotomy in the second eye, after his experience with the first, and made an iridectomy. The result of this was vision $\frac{6}{9}$, an uncommon result after this operation in glaucoma. In his judgment the fitness of the operation was about as Dr. Knapp had recorded. He continued his remarks by relating the history of a boy under ten years of age, who was brought to him with an excessively distended eyeball. The eye was twice its normal bulk, and the ciliary region was spread out into a dark zone one-fourth of an inch in length. It did not occur to him to perform sclerotomy, but he recognized the fact that iridectomy would be fruitless, and reasoned, in view of the existence of the posterior synechia and distention of the eyeball, that it would be desirable to remove the iris completely. This was accomplished by making a small section as near to the periphery of the iris and cornea into the anterior chamber as possible. A rather large, sharp-pointed hook was thrust over so as to reach the opposite side of the iris, when traction was made until the periphery of the iris gave way. As this gave way he removed, with the forceps, the entire structure. No important hemorrhage followed. A bandage was applied, and after three or four days it was found that the globe was recovering its normal diameters. In four weeks it was restored to the same dimensions as the other eye. The semi-transparent blue color became a uniform gray opacity. He did not know that such an operation had been tried in just such a case.

DR. RISLEY remarked that in November, 1878, he was consulted by a lady with absolute glaucoma in the left eye, her vision being $\frac{2}{100}$ in the right. Her field of vision was very narrow, but she could, with difficulty, go about with the remaining eye. Iridectomy had been proposed over and over again by other surgeons, but each time rejected. She finally, however, consented to the operation. A broad iridectomy above was done in November, 1878. Her field of vision widened out above to twice its former extent, and she retained vision until the following March, when it began to recede and pain came on. The first of April he found the stump of the iris at site of the

iridectomy adhering to the cornea, and then proposed and did a broad sclerotomy, making the puncture near the horizontal line and carrying the incision through the adherent stump of the iris, and succeeding in withdrawing his knife without prolapsus of the iris. The eye was bandaged, wound healed kindly, and a month later tension was normal. He saw her in June, two months after the operation, with her field of vision where it was after the iridectomy, and vision was still $\frac{20}{100}$, with a plus-cylinder.

DR. HASKET DERBY had a case where glaucomatous symptoms came on in a child seven years of age, after an operation for the removal of opaque capsule following a traumatic cataract. There was marked increase of tension, corneal anæsthesia, dilatation of the pupil, limitation of the visual field, and cupping of the disk. To avoid the deformity of an iridectomy, he had performed sclerotomy upward, in the usual manner. The wounds of puncture and counter-puncture had never solidly closed. Almost immediately a staphylomatous protrusion began to form about each of them, and up to the present time had steadily increased. There were now two rounded tumors, almost in actual contact, each about eight millimetres in diameter and six millimetres high, visible as protrusions through the closed lids. Vision had never returned. No pain had been suffered, and there were no symptoms of sympathetic irritation.

DR. WADSWORTH stated that he had only one case in which he had performed sclerotomy. This was in the person of a lady who came to him after the second attack of acute glaucoma, and with her vision reduced, as it had been for a number of weeks, to barely more than perception of light. Her pupils were very large, a little irregular, and scarcely affected by eserine. No view of the disk could be obtained. Sclerotomy was done in both eyes downward. The operation was performed as recommended by Wecker, the cut running into the inner surface of the sclera at the bridge even, but not going through it. After the operation there was no prolapsus of the iris. The operation was followed by relief from pain and the clearing of the media, but vision did not improve. The pupils still remained quite large and were drawn a little down, but no prolapse. The patient was a lady of sixty or sixty-five years of age.

DR. F. BULLER remarked that he had seen several cases in the practice of a London physician. He was of the opinion that this physician was in the habit of cutting entirely through the sclera; a staphylomatous protuberance at the seat of incision seemed to be the usual result. The doctor's own experience was confined to only one case. He performed an iridectomy in both eyes at the same time, with the result of making the tension normal. The tension remained normal for months. The patient then began to have spells of dimmer sight, then it would clear up again. This process continued for some weeks, and then he performed a sclerotomy downward, obtaining a very satisfactory result. The obscuration of the sight remained the same as before the operation, now two years ago. A bridge of sclerotic was left undivided.

NOTE ON A CASE OF UNUSUAL ACUTENESS OF VISION, WITH CIRCLES OF DIFFUSION.

By DR. G. C. HARLAN,

PHILADELPHIA, PA.

THE following case seems worth reporting as a striking illustration of the well-known, but sometimes forgotten fact, that the results of our usual method of testing the accommodation are far from accurate. It is the case of a gentleman, fifty-four years of age, who complained of some asthenopia in sustained work, though for a short time he could read or write with perfect ease and comfort. He was ordinarily using + 2.25 D. for near work, but without any glass could read the finest print fluently at four inches. The ophthalmoscope showed a refraction of + 2.25 D., without astigmatism, and testing with letters at twenty feet discovered a manifest hypermetropia of 2.25 D.

Thus the most careful application of the usual test, *i.e.*, the ability to read fine print with ease, gave an accommodation of 12.5 D. which, of course, is not to be thought of in a man fifty-four years of age. What Czermak calls the "line of accommodation," or "all that part of the visual line within which, for a given state of accommodation, objects can be seen without sensible confusion," was simply unusually extended in his case, on account of a very contracted pupil, and an acquired facility of reading through the partly closed lids.

This patient, if deprived of his lens without disturbance of the pupil, might make a very fair show of accommodation in aphakia, of which Donders says that what we here and there find noted in regard to it "proves only that the writers had no idea of the degree of distinctness of vision, even in imperfect accommodation."

REPORT OF TWO CASES OF CYST OF THE IRIS.

By DR. E. WILLIAMS,

CINCINNATI, O.

THE curability of cysts of the iris by surgical operation, and the destructive tendency of such tumors when left to themselves, are well illustrated by the two following cases. I shall not take up the time of the society by giving the literature of the subject, as that is accessible from other sources, especially by reference to a report of cases of the kind in the *Klinische Monatsblätter* for 1872, by Dr. Rothmund, of Munich. I wish to say simply that the beautiful microscopic sections which I herewith present were made by my partner, Dr. Robert Sattler. One of the best is represented in the attached cut (see opposite page), and shows the entire extent and position of the cyst-wall. Whatever the origin of this tumor may have been, it does not seem to have originated by sacculation, as the pigmented stroma of the iris is perfectly traceable underneath the cyst-wall throughout its entire extent. One of the sections passed through the shot, which was lodged near the cyst, and the brilliant cut lead surface shows in the preparation.

The little boy, whose eye was saved by a second and very extensive surgical operation, is still doing well, and enjoys useful vision in the eye.

Albert G., aged twenty-five. About eight years ago, while out on a hunting expedition with his friends, he accidentally received a volley of bird shot in the face and scalp, a number also penetrating the left eye, and resulting in immediate loss of vision.

The inflammatory reaction on the part of the eye was not severe, and did not entail a lengthy or painful suffering; he recovered in three or four weeks, to again resume his duties; his vision, however, was reduced to the perception of light and of movements of large objects.

During the intervening years nothing abnormal, either in appear-

ance or comfort of the eye, was noticed, except that vision was reduced and a slight divergence existed, and also a slight irregularity

Vertical section through upper portion of Iris cyst.

of the pupil—in the patient's own words, "A very little blister near the inner border of the pupil."

Eight weeks ago, without any assignable cause, he suffered discomfort and pain, which increased, together with redness and injection of the globe, ciliary neuralgia, luminous appearances, etc. The appearance of the eye also changed greatly; the pupil—the patient's own words—"was destroyed and pushed" outward, and the little blister increased to the size of a bean. The pain increased, and, two weeks before his visit to the office, symptoms of sympathetic irritation of the other eye became manifest.

Stat. præs.—Left eye: intense episcleral injection of globe. In the ciliary region of the sclera, on a line with the horizontal meridian, and about 3 mm. from the sclero-corneal border, is found a black point, marking either the point of entrance, or the lodgement of a shot which had penetrated in some other part and had caused a thinning of the sclera at this point. No other points of entrance or exit could be discovered. T.+. Pain severe, with paroxysmal exacerbations. Eye painful on pressure. Sympathetic irritation of fellow eye. The inner half of the iris is the seat of a cystoid enlargement, which completely fills the inner half of the anterior chamber, and is in contact with the cornea in front and lens behind. The point of origin of the cyst seems to be the inner and upper quadrant of the iris. The walls of the cyst are very thin and translucent, and the anterior wall of a light slate color. The cyst projects from the surface of the iris—it is so translucent that the iris-tissue is distinctly visible; only in the upper and inner portion, just underlying the probable point of attachment of the cyst, does the iris and its uveal layer show atrophic changes. In other parts no marked alteration is found.

Ophthal. ex. reveals extensive alterations of the vitreous, large masses of organized exudations, both floating and fixed. Fundus not visible. V.=0. Enucleation April 5, 1880.

Sectio oculi.—The eye, hardened in Müller's fluid, showed no abnormity either in dimensions or shape of the globe. In the sclera, $3\frac{1}{2}$ mm. from the inner corneal border, is found a discoloration and thinning about the size of a millet-seed. Other points were not discovered. The optic nerve was cut off very close to the sclera, and showed a deep excavation.

Equatorial section.—Posterior chamber filled with coagulated and organized vitreous; about two-thirds of the area of the retina detached by a firm sub-retinal exudation. Directly outward and upward from the region of the macula, the retina, together with a firmly organized mass of lymph, is adherent. Examination reveals

a small bird-shot firmly imbedded in organized lymph, and partially forced through the retina and choroid, and in contact with the sclera at this point.

Examination of anterior half of globe; section parallel to vertical meridian of cornea and just external to the outer border of the cyst. Lens *in situ*. The cyst has collapsed, but its dimensions are distinctly traceable. The outer half of the iris shows no alterations. The cyst projects from the outer or superficial structure; its attachment is very near the iris angle; the lower, but more especially the upper and inner quadrants, show evidences of atrophic degeneration. The uvea is everywhere present, but immediately under the probable point of attachment it is perceptibly atrophied. Some distance below the point of alteration in the sclera is found a shot intimately in contact with the ciliary body and surrounded by organized lymph.

A. W., aged nine years. Two years ago the right eye was injured by an angular piece of slate, resulting in a penetrating vertical wound of the cornea parallel to the vertical meridian, and extending from the sclero-corneal border almost to its centre.

The inflammatory reaction was not violent, and the eye recovered with a linear incarceration of the iris in the corneal cicatrix. Several months afterward the eye became irritable to light, together with discomfort and greater impairment of sight. These paroxysms were never violent, and recurred at variable intervals. Some months prior to his visit the father noticed a slight colored projection from the corneal scar and extending toward the pupil. This increased steadily, and on his first visit, March, 1879, a lobulated cyst of the iris, the largest division on the outer and the smaller on the inner side of the corneal cicatrix, was distinctly visible. The eye was free from irritation. T. not increased, and vision moderately good.

March 18th.—Removal of cyst by a peripheral linear incision with v. Graefe's knife. The cysts encroached so thoroughly on the iris angle that in making the incision it immediately collapsed. An attempt was then made to seize the outer division of the cyst and adjacent iris, and this was most effectually accomplished; the inner division collapsed, and the corneal scar and firmly adherent iris, and small sclero-corneal incision, prevented the introduction of the forceps, and its removal was therefore abandoned. Little or no reaction followed, and in July, 1879, a large coloboma of the iris existed outward, with no trace of the cyst on the outer side of the corneal

scar, but with a distinct nodular translucent elevation about the size of a grain of wheat on the inner side. T. not increased. No pain. From this time the cystoid enlargement continued steadily to increase, with occasional paroxysms of discomfort, photophobia, and progressive impairment of sight.

In January, 1880, the cyst again consisted of two divisions, filling about one-half of the anterior chamber, and leaving only a narrow rim of iris above.

Removal was again urged. A large and free peripheral incision was made directly downward. The incarcerated iris was seized between the arms of a strong iris-forceps, and with gentle traction detached from the cornea, and the angles of the round wound were then carefully freed from iris-tissue. Recovery was not impeded, and a smooth and regular wound resulted, with complete disappearance of the cyst.

April, 1880.—Eye free from all injection. Has not suffered the slightest pain or discomfort. Very narrow border of iris visible above. Lens clear. Fundus visible and perfectly normal. V.=$\frac{15}{10}$, with stenopaic, $\frac{15}{50}$—.

REMARKS.

DR. KNAPP remarked that he had removed a large cyst of the iris from a patient a year ago, and that last week the same patient returned to him having developed a second cyst, no bigger than a pinhead, some distance from the seat of the original. The second cyst was perfectly circumscribed, having a distinct wall. It simulated a cup-like excavation in the iris, which was completely empty. He removed it, making, with a lance-shaped knife, an incision close to the border of the cornea. Then by pressure upon the eye the cyst was forced out, appearing as a transparent bead of vitreous. Afterward the iris was made to prolapse, so that the bottom of the cyst, with the adjacent iris, was removed. After the healing process was complete, there remained only a very small coloboma. The cyst itself showed the iris-tissue very plainly, and over the surface of the iris a single layer of epithelium was nicely defined. The cyst was wounded with the knife in its removal. Dr. K. had removed other cysts, without injury to them, by the knife. He thought there was no doubt but that these cysts originated from the epithelial layer of the iris. There might be a folding-in of the iris to a very slight extent, forming a serous cavity which enlarged, and ultimately became recognizable as a cyst. Whether in the case referred to by him the cyst was the result of transportation of cells, or of sacculation, he could not say.

THE PRESIDENT remarked that he had had occasion within the last

two years to operate for a congenital cyst of the iris. The patient continued well for a long time, and though sympathetic trouble of the other eye was threatened, no secondary degeneration occurred.

DR. KNAPP stated that he had reported a case in which the cyst originated in a scar from a foreign body in the vitreous. Six years after the successful removal of the foreign body the cyst made its appearance. It was cut out, but returned about a year later. It was removed again. The operation was rather a desperate one. With the forceps and scraping-hook Dr. Knapp cleansed the sinus of the anterior chamber most thoroughly. This was a very tedious performance. The case did well, and it was now more than a year since the operation. The eye was in good condition, and there were no signs of a return of the trouble.

DR. BULL remarked that about a year ago he removed a cyst for capsular opacity. The pupil was only movable above; vision $\frac{20}{30}$. An incision was made and he endeavored to cause prolapse of the cyst, but, failing in this, he entered the eye, bringing the iris out, which included the cyst with it. Upon examination he then found that the capsule was entirely opaque. The explanation of the origin of this cyst was the same as that given by Dr. Knapp, namely, a simple prolapse including the epithelial surface of the iris, which finally resulted in the production of a cyst.

DR. E. WILLIAMS inquired if, in the case just reported, the capsular opacity was the size of the cyst.

DR. BULL replied that it was.

DR. KIPP remarked that he had had a case of cyst of the iris which was cured spontaneously. A girl was shot in the eye with a number of small bird-shots, one of which still remained in the lower part of the anterior chamber, and had been there two years without causing any disturbance. Last year a small cyst developed in the upper part of the iris, close to the wound of entrance of the shot in the sclero-corneal margin, and an operation was advised. The patient did not return for a time, and in four weeks more it had disappeared. In this case Dr. Kipp thought he could distinctly see a separation between the layers of the iris, indicative of the epithelial origin of the cyst. By means of oblique illumination he could see quite through it.

DR. AGNEW remarked that we all knew that the general indication in removing a cyst of the iris was to postpone its rupture as long as possible, and to remove the cyst with the piece of the iris upon which it was implanted. Finding it somewhat difficult to make a wound with a knife sufficiently large to permit the easy extrusion of the cyst, he had been in the habit of making a wound in the cornea large enough to admit the blade of a pair of probe-pointed scissors. Having done this he passed one of the blades of the scissors into the anterior chamber, avoiding, if possible, the region of the cyst, and thus completed the wound. It was very difficult to get a sufficiently large opening into the anterior chamber to admit of the easy removal of the cyst before it ruptured.

DR. KNAPP remarked that in other tumors of the iris he felt that necessity, but, instead of making an opening in the manner described by Dr. Agnew, he took a narrow v. Graefe's knife to make the incision, which being done, he completed the operation after Streatfield's way of operating for cataract.

The PRESIDENT said that he had found it a useful mode to take a pair of scissors curved on the flat, and to have both points very sharp, which would enable the operator to work with great facility. With these scissors one could cut more than two millimetres at a time and could go half way around the cornea.

THREE CASES OF PERSISTENT PUPILLARY MEMBRANE.

BY DR. C. R. AGNEW,

NEW YORK.

CASE I.—R. A., a boy seven years of age, was referred to me by Dr. R. F. Weir, for divergent strabismus of his left eye. The vision of his right eye was found to be $\frac{20}{xx}$, and that of his left $\frac{20}{c}$. The refraction, as determined by ophthalmoscopic tests, was: right eye, H. $\frac{1}{24}$; left eye, H. $\frac{1}{16}$.

In the right eye there was a small opacity on the posterior capsule of the lens a little to the nasal side of its centre, probably a remnant of the hyaloid artery. The left eye presented a beautiful specimen of persistent pupillary membrane, a condition which the picture of the eye, on opposite page, by Dr. C. Heitzmann, represents far more faithfully than I can describe it in words.

The mother of this child was examined with the ophthalmoscope. Her right eye was found to be myopic $\frac{1}{3}$, and her left myopic $\frac{1}{2}$. Both eyes presented extensive staphyloma posticum.

CASE II.—J. E. W., a married woman, sixty-two years of age, consulted me on account of "a disagreeable feeling as of sticks in the eyes."

I found: right eye, vision $\frac{20}{x}$ without a glass, made $\frac{20}{xx}$ by + $\frac{1}{12}$; left eye, vision $\frac{20}{x}$, made $\frac{20}{xx}$ by + $\frac{1}{36}$. Ophthalmoscopic examination revealed the presence of numerous dust like opacities in the peripheries of both lenses, and abundant floating specks in the

anterior portion of the vitreous humor of both eyes. There were also to be seen in the left eye a few delicate, thread-like opacities attached to the sphincter iridis, and extending across the nasal margin of the pupil, and anastomosing with one another.

CASE III.—S. M., artist, thirty years of age, states that two weeks ago the lower "wisdom-tooth," on his right side, became ulcerated,

and he abused his eyes by working for hours in succession by a magic lantern; the next day or two he worked on buff paper without a lamp. For the last three or four days his right eye has felt "swelled," and the vision has become somewhat obscured. The eye is painful afternoons.

The usual tests show:

Right eye, V. $\frac{20}{xxx}$; $\frac{20}{xx}$ with $+\frac{1}{48}$ s. $\bigcirc$ $+\frac{1}{60}$ c. ax. 90°.

Left eye, V. $\frac{20}{xx}$; improved by $+\frac{1}{60}$ c. ax. 90°.

Ophthalmoscopic examination shows small, bead-like, floating bodies in the right vitreous. In the left eye there is a single slender filament attached at both ends to the pupillary edge, and extending downward and outward across the temporal portion of the pupil—undoubtedly the remains of the fœtal pupillary membrane.

After some weeks' rest and the use of atropine in the right eye, with colored glasses, the floating, bubble-like opacities disappeared. Mr. M. was then found to have vision $\frac{20}{xx}$ in both eyes, with $+\frac{1}{60}$ c. ax. 90°, which glasses were ordered.

It is remarkable that in all three cases reported above the *mem-*

brana pupillaris persevcrans affected only the left eye. Also, all the cases were hypermetropic.

The first case illustrates a fact in heredity which I have frequently observed, namely: that where the refraction of the parent is abnormal the refraction of the child is likely also to deviate from the normal type, but may be the reverse of that of the parent.

THE INSUFFICIENCY OF THE OPHTHALMOSCOPE AS THE SOLE TEST OF ERRORS OF REFRACTION.

BY DR. C. R. AGNEW,

NEW YORK.

IN the *Boston Medical and Surgical Journal* for June 24, 1880, occurs a letter from Dr. Hasket Derby, entitled "Near-Sight in the Young," in which he replies to a communication to the same journal, under date of June 17th, from Dr. David Webster. It is not our intention to discuss the questions alluded to in the first portion of Dr. Derby's letter, but to reply to its closing paragraph. The paragraph is as follows: "Dr. Webster's concluding statement, that atropine will reveal a condition of the refraction which the ophthalmoscope has failed to discover, is so utterly opposed to general experience as to require no special refutation. The doctrine of the ability of the ophthalmoscope to determine the optical condition of the eye, first announced by Helmholtz, the inventor of the instrument, and confirmed by Mauthner in his brilliant treatise, may be said to be universally accepted. At the last meeting of the American Ophthalmological Society, Dr. Agnew gave utterance to views similar to those here put forth by Dr. Webster. Unless I am much mistaken he was found to stand alone in their advocacy, and was at once contradicted by Dr. Knapp."

It is true that we did, in the meeting alluded to, make a few brief remarks in asserting the insufficiency of the ophthalmoscope as the sole test of ametropia, in commenting upon the results which Dr. Derby presented to the Society of his examination of the eyes of the students of Amherst College. We contended that it is often impossible, however skilful the observer may be, to determine either the

quality or the quantity of the error of refraction with the ophthalmoscope alone, while the accommodation of the eye under observation is actively at work, and that the observer is by no means sure that the kind or amount of apparent ametropia is really what the ophthalmoscope seems to show it to be.

Hence, in many cases of asthenopia, the only safe way to study the refraction is to pursue the following method:

1. To examine the eyes first with the ophthalmoscope, and at the moment record the result.
2. To make the glass-test next and record its result.
3. To bring both eyes fully under the influence of atropia.
4. To test the eyes with the ophthalmoscope again, the eyes being under the influence of atropia.
5. To make a second glass-test, the eyes being under the influence of atropia.
6. To test the eyes with the ophthalmoscope and glasses at the end of ten days or two weeks, or when they shall have recovered from the effects of the atropia.

By recording the results of the ophthalmoscopic tests before making glass-tests, the observer gets the objective symptoms without any probability of the statements of the patient producing the slightest prejudice in his mind.

By such careful procedure, and by such alone, so far as our experience goes, may we safely deal with the apparent errors of refraction which occur in persons between the ages of ten and thirty-five years of age. We did not find this out till persons returned to us with unsatisfactory glasses which we had fitted after glass test and ophthalmoscopic test alone, without atropia, or till we began to hear from our colleagues concerning cases of asthenopia which our glasses had not relieved, but which those selected by them had. Atropia had enabled them to discover and correct a variation in ametropia, which our glass and ophthalmoscope tests alone had not revealed. We do not say that we are necessarily to fit a glass, in all cases, to the ametropia which is revealed after full nullification of accommodation. Sometimes we may in myopia or in hypermetropia, where the asthenopia cannot be relieved short of a sharp correction of the extreme amount of ametropia. This is notably necessary in cases in which insufficient and otherwise erroneous correction has been made by the patient selecting his own glasses, by the optician giving over his counter

those which seemed to be best, or by the physician selecting them by a glass and ophthalmoscopic test without atropia.

The safest, and therefore the best way to make the diagnosis in asthenopia is to record the *data*, as indicated in the six steps above, and to give the glass, or correction, which embodies the results of all the steps. As an extra precaution the observer should record the data of his ophthalmoscopic tests *before* he makes any glass-tests.

We have had a patient, a college student, come to our office wearing *minus* elevens, which he had selected by the aid of an optician as those with which he seemed to be able to see best, far and near, who turned out, after thorough saturation of his ciliary muscle with atropia, to be largely hypermetropic, so Titanic was his spasm of accommodation.

We must not turn to the fathers of ophthalmology in any spirit of abject submission to their dicta. We must show ourselves worthy of our parentage. We must cultivate the same spirit of independent research which enabled them to do so much. They, by precept and example, bid us search for facts, and to use facts in a logical way.

Ophthalmology, however vast its progress since 1855 under the impetus given by Helmholtz, Donders, Von Graefe, Arlt, Bowman, and others, is not a finished science or art. Immense results yet await us, and in no domain are we to expect more than in that of *clinical observation*; and who is to say, if we are really moved by the animus of the fathers, whether we may not at noon-day see some things which they did not discover, or draw deductions which may vary greatly from those which they derived.

It will put a stop to science and art, as it has before now to good movements in the domain of morals and religion, if we submit in any spirit of servile subjection to the dicta of the fathers. Then, moreover, we may misinterpret or misrepresent the fathers, and thus embarrass our exercise of the natural and inalienable right of free thought, which they by their example have constantly encouraged us to value and use.

As we must bring the matter, however, to a clinical test, we take from our case-book, in the few hours which have intervened since the letter alluded to fell under our observation, the following brief cases, and for the labor of the collection we are indebted to Dr. D. Webster.

CASE I.—G. K., aged twenty-two, bookkeeper. Became cross-eyed at the age of four. Was operated upon by Dr. — —, first upon

the right eye, and a year later upon the left eye. Has since then been much annoyed by diplopia.

R. V. = $\frac{20}{20}$: Hm. $\frac{1}{36}$.

L. V. = $\frac{20}{20}$: Em.

Insufficiency of int. rect., 24° at 20′.

" " ext. " 13° " 1′.

Ophthalmoscopic examination: nasal edges of optic disks pigmented; choroidal field marked by deep pigment-streaks. Right, hypermetropic $\frac{1}{48}$. Left, emmetropic.

As the diplopia was, at times, very distressing, and produced confusion and much asthenopia, we sent the patient to get the advice of Dr. ——, and also of Dr. ——, two of our most skilful colleagues, and we give their written replies verbatim.

Dr. —— says: "Nov. 7, 1873. This case of K. is one where the squint was due to extremely weak externi, especially of the right eye, and now he has insufficiency of interni for the whole horizon, far and near. When he looks at the finger held within three inches he seems to converge to excess, but careful tests with prisms and a candle show that at this place there are extremely divergent double images, amounting to about 40° prisms, bases inward. To account for this anomaly there must be a fault of projection in the right eye, which came from the prolonged period of squint, by which some other spot of the retina than the macula took on its functions, and he doubtless had, as some do, binocular vision with squint. He now fixes, sometimes with one eye and sometimes with the other, but always with the physiological conditions of divergence. I find in the right eye weakness of externus and also of internus; in left eye weakness of externus and not much of internus. He had better have converging squint than his present state: but to cut one externus would aggravate the state of general tremulousness which now affects the right eye. I would therefore not do an operation of any kind—the only one which I would consider physiological being to advance one or both recti interni and produce squint. But now I would correct his hypermetropia, which in the right is $+\frac{1}{48}$ and in the left $+\frac{1}{36}$, would cover up and throw out of use the left eye, and make him practise the right eye, and after six months see what has been gained. He should use the right eye for half of every day. I am very glad to see this case. It has been a refreshing puzzle, and this is my solution. I have not time to copy this, but desire to have a copy at your convenience, which I will take.

"Yours ever, ——."

Dr. —— comments on the same case as follows, and we give his entire note verbatim, simply suppressing the full name of the patient:

"NEW YORK, November 8, 1873.

"C. R. AGNEW, M.D.:

"*Dear Doctor*—In examining K.'s eyes I find that by +50 cyl. axis upright, S. from $\frac{20}{30}$ and $\frac{20}{40}$ is improved to $\frac{20}{20}$ in either eye. With the ophthalmoscope I find the eyes emmetropic. There is some dynamic and ordinary convergence left, but the crossed double images are distinct. The squinting eye, therefore, had another centre of binocular fixation in the inner half of the retina. This condition of projection, undoubtedly acquired before the operation, still exists. The movements of the eyes could not be better. With regard to further details and prognosis, I should like to speak to you on our next meeting. As to treatment, I would recommend the use of the above-mentioned cylindrical glasses.

"Yours truly, ——."

The glasses recommended by the latter, as the patient desired to try them, were ordered, and the case went from under observation. He returned, however, April 24, 1878, more than four years afterward, stating that he had been troubled by diplopia and pain, "and seeing black and white, kind of peppery" (possibly a conventional phrase for circles of dispersion), since he had worn the cylindrics, just about as much as before. Has been benefited by the glasses only by seeing more distinctly. Vision, however, is now, without glasses, $\frac{20}{30}$ each—an apparent reduction. As the distress of the patient was so great, we determined to do what we should have done before, namely, to nullify the accommodation by atropia.

A solution of sulphate of atropia, four grains to the ounce, was therefore dropped into the eyes five consecutive times, and he was kept in the office during the morning under observation till the full physiological effects were obtained.

He was then examined with glasses, and found to have the following total errors of refraction:

R. V. = $\frac{20}{20}$ with $+\frac{1}{15}$ s. $\frown$ $+\frac{1}{30}$ c. ax. 95°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{18}$ s. $\frown$ $+\frac{1}{42}$ c. ax. 90°.

May 9th.—Fifteen days afterward he returned, the atropia effect passed off, and reported "eyes never felt better than during the last week," or the period of lessened accommodation.

Examination with glasses now showed :

R. V. $= \frac{20}{20}$ with $+ \frac{1}{30}$ s. $\frown + \frac{1}{18}$ c. ax. 90°.
L. V. $= \frac{20}{20}$ with $+ \frac{1}{36}$ s. $\frown + \frac{1}{18}$ c. ax. 90°.

Which glasses were ordered for constant use.

April 27, 1880.—Returned after an absence of a year, and reports "very much troubled by double images ; catches a double object which flies back to a single one, and so it goes, first double and then single, and is very annoying. Loses the place in reading, and the annoyance is at all distances."

R. V. $= \frac{20}{20}$ with $+ \frac{1}{24}$ s. $\frown + \frac{1}{18}$ c. ax. 90°.
L. V. $= \frac{20}{20}$ with $+ \frac{1}{24}$ s. $\frown + \frac{1}{18}$ c. ax. 90°.

Ordered the above ground upon prisms of $2\frac{1}{2}°$ for each eye, base to nose, to be worn constantly.

April 30th.—Has worn the above glasses since he obtained them, with relief.

Now, the above is a case in which Dr. ——, our second correspondent, concluded, after ophthalmoscopic examination, that both eyes were emmetropic, although both accepted a + cylindric in the glass-test. Dr. Webster and myself found that the right eye, under glass-test, had a manifest hypermetropia of $+ \frac{1}{36}$, and that the left eye was emmetropic—that is, refused a $+ \frac{1}{12}$, or $- \frac{1}{12}$; that the right eye, under the ophthalmoscope, was $+ \frac{1}{48}$ hypermetropic, and the left eye emmetropic. Dr. ——, our first correspondent, found the hypermetropia to be $+ \frac{1}{18}$ in the right eye, and about $+ \frac{1}{36}$ in the left eye, but does not say whether with glasses or the opinthalmoscope, or with both.

Under atropia, Dr. Webster and I found the eyes as follows :

R. V. $= \frac{20}{20}$ with $+ \frac{1}{16}$ s. $\frown + \frac{1}{30}$ c. ax. 95°.
L. V. $= \frac{20}{20}$ with $+ \frac{1}{18}$ s. $\frown + \frac{1}{12}$ c. ax. 90°.

And after the eyes had recovered from atropia, and the snarl been, as it were, taken out of the accommodation, the apparent ametropia :

R. V. $= \frac{20}{20}$ with $+ \frac{1}{30}$ s. $\frown + \frac{1}{18}$ c. ax. 90°.
L. V. $= \frac{20}{20}$ with $+ \frac{1}{36}$ s. $\frown + \frac{1}{18}$ c. ax. 90°.

Now, we trust it is unnecessary to say that we do not give these details to attract attention either to our own mistakes or to those of our colleagues, but simply to show what may happen in the experience of men whom every competent judge confides in, and whose studies with glasses and the ophthalmoscope are probably as

acute and painstaking as possible, and in whose decisions, in cases of asthenopia, Helmholtz and Mauthner would doubtless cheerfully acquiesce.

The case is probably not yet cured, and will, more than likely, sooner or later overcome his extreme aversion to a convergent squint, and yield to the wise suggestion of our colleague, Dr. ——, the first correspondent.

The following cases of apparent myopia are also of value:

CASE II.—Mrs. M. R., aged thirty-four years; asthenopia, June 10, 1880.

R. V. $= \frac{20}{50}$: with $-\frac{1}{36}$ c. ax. 180° V. $= \frac{20}{20}$.
L. V. $= \frac{20}{30}$: with $-\frac{1}{42}$ c. ax. 180° V. $= \frac{20}{20}$.

Ophthalmoscopic examination: apparently myopic astigmatism.

Advised to submit to atropia.

July 13th.—Has used a solution of sulphate of atropia of the strength of two grains to the ounce three times a day for two consecutive days.

R. V. $= \frac{20}{20}$ with $+\frac{1}{42}$ s. $\frown$ $+\frac{1}{30}$ c. ax. 90°.
L. V. $= \frac{20}{20}$ with $+\frac{1}{42}$ s. $\frown$ $+\frac{1}{30}$ c. ax. 90°.

Ophthalmoscopic examination under atropia: as above, hypermetropic astigmatism.

CASE III.—J. K., a girl, aged twelve years, has for a year and a half suffered from blurring of vision and pain over the eyes.

October 21, 1879.—

R. V. $= \frac{20}{40}$: with $-\frac{1}{24}$ V. $= \frac{20}{30}$.
L. V. $= \frac{20}{50}$: with $-\frac{1}{24}$ V. $= \frac{20}{20}$.

The ophthalmoscope shows small crescent of choroidal atrophy at temporal edges of disks, and apparent myopia. It seems less than $-\frac{1}{24}$, however.

Ordered atropia and colored glasses.

November 12, 1879.—The atropia was used sixteen days, and stopped six days ago.

R. V. $= \frac{20}{20}$ with $+\frac{1}{24}$
L. V. $= \frac{20}{20}$ with $+\frac{1}{24}$

Instead of an apparent myopia of $-\frac{1}{24}$, the child now has a manifest hypermetropia of $+\frac{1}{24}$; ordered $+\frac{1}{24}$ for constant use. The case

may safely be regarded as one in which a progressive myopia was being developed in hypermetropic eyes.

Case IV.—February 15, 1878.—E. H., an architect, aged seventeen, complains that the steady use of his eyes at his drawing and in reading produces dimness.

R. V. = $\frac{2}{10}$: with $-\frac{1}{18}$ V. = $\frac{2}{20}$.
L. V. = $\frac{2}{10}$: with $-\frac{1}{60}$ V. = $\frac{2}{20}$.

Ophthalmoscope: emmetropic, both. Ordered atropia.

February 16th (the next day).

R. V. = $\frac{2}{20}$ with $+\frac{1}{20}$.
L. V. = $\frac{2}{20}$ with $+\frac{1}{36}$.

Atropia continued daily.

February 19th.—

R. V. = $\frac{2}{20}$ with $+\frac{1}{18}$.
L. V. = $\frac{2}{20}$ with $+\frac{1}{20}$.

March 1st.—Effects of the atropia passed off.

R. V. = $\frac{2}{20}$ with $+\frac{1}{12}$.
L. V. = $\frac{2}{20}$ with $-\frac{1}{12}$.

But on putting $+\frac{1}{18}$ over both eyes, and compelling the patient to wear them, vision presently became $\frac{2}{20}$. Ordered $+\frac{1}{36}$ for constant use, with the prospect of changing glasses to a nearer approximation to total hypermetropia.

Case V.—February 7, 1880.—Miss F., aged fifteen, has had recurring styes and blepharitis marginalis, for years.

R. V. = $\frac{2}{30}$: $\frac{2}{20}$ with $-\frac{1}{60}$ c. ax. 180°.
L. V. = $\frac{2}{30}$: $\frac{2}{20}$ with $-\frac{1}{60}$ c. ax. 180°.

Ophthalmoscope: no lesion; both eyes apparently emmetropic.

February 11th.—Atropia gr. iv. to ounce instilled three times in each eye during the morning.

R. V. = $\frac{2}{80}$: $\frac{2}{20}$ with $+\frac{1}{12}$ s.
L. V. = $\frac{2}{60}$: $\frac{2}{20}$ with $+\frac{1}{36}$ s.

An hour later, mouth dry and other signs of complete atropine effect. V. = $\frac{2}{20}$ each eye with $+\frac{1}{36}$.

Case VI.—March 17, 1880.—P. H. W., a boy aged twelve, complains of near-sightedness. Has some pain after reading a few moments.

Ophthalmoscope: myopia $-\frac{1}{48}$. No staphyloma posticum.

R. V. $=\frac{20}{30}$: $\frac{20}{20}$ with $-\frac{1}{60}$ s.
L. V. $=\frac{20}{30}$: $\frac{20}{20}$ with $-\frac{1}{48}$ s.

March 20th.—Under atropia.

R. V. $=\frac{20}{40}$: $\frac{20}{20}$ with $+\frac{1}{48}$.
L. V. $=\frac{20}{40}$: $\frac{20}{20}$ with $+\frac{1}{48}$.

April 10th.—After effects of atropia had entirely gone, apparent myopia also gone, and replaced by a manifest hypermetropia in each eye of $+\frac{1}{60}$. Ordered $+\frac{1}{60}$ for near work.

CASE VII.—November 27, 1875.—W. B. G., aged twenty-one, complains of black specks before eyes, and defective vision.

R. V. $=\frac{20}{70}$: V. $=\frac{20}{20}$ with $-\frac{1}{30}$ c. ax. 180°.
L. V. $=\frac{20}{50}$: V. $=\frac{20}{20}$ with $-\frac{1}{30}$ c. ax. 180°.

Ophthalmoscope: no lesion; apparently myopic astigmatism.

November 29th.—Ordered $-\frac{1}{36}$ c. ax. 180° for both eyes, to be worn constantly.

May 22, 1878.—"Has failed to use the glasses as much as he should, and does not see as well as he should."

May 24th.—

R. V. $=\frac{20}{20}$ with $+\frac{1}{30}$ c. ax. 90° $\frown$ $-\frac{1}{30}$ c. ax. 180°.
L. V. $=\frac{20}{20}$ with $+\frac{1}{30}$ c. ax. 85° $\frown$ $-\frac{1}{30}$ c. ax. 175°.

June 3d.—Under atropine.

V. $=\frac{20}{20}$ each with $+\frac{1}{24}$ c. ax. 90° $\frown$ $-\frac{1}{24}$ c. ax. 180°.

June 17th.—

V. $\frac{20}{20}$ each with $+\frac{1}{30}$ c. ax. 90° $\frown$ $-\frac{1}{30}$ c. ax. 180°.

Atropia effect passed off. Ordered the above for constant use.

CASE VIII.—Apparent emmetropia with the ophthalmoscope.

August 10, 1878.—W. R. P., aged twenty-nine, clerk, had some trouble with his eyes in 1860, which the doctor called "weakness of the optic nerves," and, though temporarily benefited by tonics and attention to his general health, the weakness of the eyes has continued. They ache on use and whenever he gets fatigued.

R. V. $=\frac{20}{30}$: V. $=\frac{20}{20}$ with $+\frac{1}{60}$ c. ax. 90°.
L. V. $=\frac{20}{30}$: V. $=\frac{20}{20}$ with $+\frac{1}{60}$ c. ax. 100°.

Insufficiency of the interni 4° at 1′, and of the externi, 1° at 20.

Ophthalmoscope: no lesion; both eyes apparently emmetropic.

August 14th.—After three instillations of a four-grain solution of atropia, and waiting three hours:

R. V. = $\frac{20}{20}$ with $+\frac{1}{11}$.
L. V. = $\frac{20}{20}$ " $+\frac{1}{10}$.

August 28th.—Effects of atropia having passed away:

R. V. = $\frac{20}{20}$ with $+\frac{1}{21}$.
L. V. = $\frac{20}{20}$ " $+\frac{1}{21}$.

Which were ordered for constant use.

Case IX.—Largely underestimated hypermetropia with the ophthalmoscope.

October 16, 1877.—C. W. L., aged twenty-seven, has had inflammation of edges of eyelids for three years. The more he uses the eyes, the more irritable the lids become. V. = $\frac{20}{20}$ each; cannot read $\frac{20}{20}$ through $+\frac{1}{72}$ with either eye. No muscular insufficiency.

June 13, 1878.—V. = $\frac{20}{20}$ each; cannot read $\frac{20}{20}$ through $+\frac{1}{72}$ with either eye. Ophthalmoscope: slight hypermetropia; no lesion.

After instillation of atropia thrice, and waiting one hour:

V. = $\frac{20}{20}$ with $+\frac{1}{36}$ s. $\frown$ $+\frac{1}{60}$ c. ax. 180° each.

Case X.—Hypermetropia largely underestimated with the ophthalmoscope.

March 2, 1878.—Mrs. J. M. G., aged twenty-nine, has had for a year an itching and burning sensation in the eyelids, with occasional blurring of the sight. Some pain also, and soreness of the eyes. For the last eight or ten years has had frequent attacks of severe headache, confined to the left side of the head and the left eye. These attacks have increased in frequency, and of late occurred as often as once a week.

V. = $\frac{20}{20}$ each: $+\frac{1}{72}$ blurs each eye. Ophthalmoscope, apparent hypermetropia $+\frac{1}{18}$ each, and small central or physiological excavation of the disks.

After two instillations of atropia, and waiting:

R. V. = $\frac{20}{20}$ with $+\frac{1}{15}$ s. $\frown$ $+\frac{1}{18}$ c. ax. 90°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{14}$ s. $\frown$ $+\frac{1}{18}$ c. ax. 90°.

It may be said that such cases are rare and exceptional, and that in the vast majority of cases of asthenopia we are justified in prescribing after a glass and ophthalmoscopic test. That may be so,

but we are bound to confess that we have never had occasion to regret the more thorough method of the threefold glass and ophthalmoscopic test applied before, during, and after atropia, and to affirm that the inconvenience to the patient of having the accommodation suspended for several days is as nothing compared with the doubt which so frequently clings to the prescription of glasses without the factor which the entire nullification of the accommodation alone admits of. Especially is this true as regards the classes of eye-workers in school and professions. The proper selection of a pair of glasses in such cases is often of unspeakable value. It often determines the question whether a student should turn from a chosen vocation, upon which he may have already spent much time and effort, to an avocation for which he has no taste or aptitude.

The few days of inconvenience resulting from the use of atropia is as nothing compared with its possible and probable advantages. Moreover, it is not unfrequently in cases in which your glass and ophthalmoscopic tests seem to be most conclusive that a mistake may arise.

We trust that we need not say that we are expert in the use of the ophthalmoscope, or that we are not. Our colleagues must judge. They have often done us the credit, however, of saying that we were. This much we do know: that we have not unfrequently made mistakes in determining errors of refraction with the ophthalmoscope alone. We have heard of it through the kindness of our colleagues, and occasionally through the complaints of patients. We have known the best skilled of our colleagues to make similar mistakes, and we are not sure that our being allowed to "stand alone" in the advocacy of the views advanced in this communication was not more due to the want of time for confessions all around the circle than from any inherent heresy in the views themselves.

Are we, then, to be charged with undervaluing the ophthalmoscope as an instrument for studying the means of refraction? By no means. Its value will be all the greater if we studiously limit, or guard, its application, and test its revelations by every possible clinical method. If we rely upon it with anything resembling abject or servile subjection we may be deceived, especially if we cripple ourselves by drawing false conclusions from the apparent dicta of the fathers. Much as we love the latter we must remember that they nowhere claim infallibility, and that our filial loyalty will be best proved by reverently reaching out on all sides for the truth, for the truth's sake; and we may find it, at times, apparently

against some of the dicta of past experience. But in our remarks, as well as in this brief clinical paper, we are advancing no new doctrine, much less promulgating heretical opposition to the teachings of authorities. Were it in keeping with the simple purposes of this brief clinical paper, we might go back over the proceedings of the American Ophthalmological Society, and cite from them, as, indeed, from other current ophthalmic literature, to prove that several of our colleagues have already touched on the same theme, and, therefore, made it apparent that we did not "stand alone." The cases cited in this paper run back as far as 1875, and it would be possible to show from our case-book, that, certainly as early as 1873, and perhaps earlier, we were awake to the dangers of trusting too implicitly or blindly to the ophthalmoscope as the sole test of ametropia.

REMARKS.

DR. H. DERBY asked Dr. Agnew whether Helmholtz had not claimed for the instrument "the ability to determine the optical condition of the eye, independent of its visual power or the statements of the person examined."

DR. AGNEW so understood it.

DR. DERBY inquired whether Dr. Agnew did not himself maintain that, in many cases, the true amount of latent hypermetropia could not be ascertained by the use of the mirror only.

DR. AGNEW replied in the affirmative.

DR. DERBY expressed himself as unable to see any agreement between the statement of Helmholtz and the views held by Dr. Agnew.

DR. AGNEW characterized his agreement with Helmholtz as a *substantial* one.

DR. WEBSTER said that what led to this discussion was an article published in the *Boston Medical and Surgical Journal*, in which the author, Dr. Hasket Derby, asserted that near-sight might begin with spasm of the accommodation, and cited, in support of this theory, the case of a student at Amherst College, whose eyes he had found at his first examination near-sighted. One year later he examined him again and found his near sight entirely gone, and so concluded that when first examined he had been laboring under accommodative spasm. Three and a half years after the second examination he had made a third, and found that "true near sight, to a considerable amount, had made its appearance, and the ophthalmoscope showed it to be real, and not due to spasm." This case seemed to him (Dr. Webster) inconclusive, as atropine had not been used. The young man might have had a *recurrence* of spasm of the accommodation, in which case the eyes might have appeared to be really near sighted when examined with the ophthalmoscope, and yet really not myopic, but retaining the same degree of refraction as when examined the

second time. He (Dr. W.) thought that all would agree that where spasm of the accommodation was excluded the true refraction of the eye could generally be very closely approximated with the ophthalmoscope; that those were mistaken, however, who believed that in all cases of spasm of the ciliary muscle the accommodation was sure to become relaxed under the glare of light thrown upon the eye in ophthalmoscopic examination.

DR. AGNEW stated that the title of his paper was, "The Insufficiency of the Ophthalmoscope as the Sole Test of Ametropia in the Diagnosis of Asthenopia." He thought that the majority of cases of asthenopia were entitled to an examination both with the ophthalmoscope and with atropia: first, with the ophthalmoscope and then with atropia; then, after the effect of the atropia has passed off, with glasses and atropia.

Dr. Agnew thought all these means should be employed because he did not know in just what cases spasm of the accommodation could be determined without that sort of an analysis.

DR. KNAPP thought spasm of the accommodation was a rare occurrence; but he concurred with Dr. Agnew, that, in obscure cases of asthenopia, all means at our command for making a diagnosis should be employed.

Dr. Knapp remarked that the use of the ophthalmoscope was certainly not the only means of determining the refraction of the eye, but that it was probably the best. He wished to point out those conditions in which its use would lead to fallacious opinions:

First.—He had committed errors when the relief of the fundus oculi was irregular. *Secondly*, in astigmatism. If we examined the minute blood-vessels—those, for instance, which passed from the disk directly toward the yellow spot, we obtained the refractive condition of a particular meridian only (the vertical, in the above example), and we could appreciate the proper degree of ametropia only by the successive determination of the refraction of fine blood-vessels that showed different directions. The third fallacy was the influence of the ocular muscles upon refraction, particularly in convergent squint, in which, without artificial paralysis of accommodation, we could determine only the far point of the relative accommodation.

NEURITIS AFTER MEASLES.

By DR. O. F. WADSWORTH,

BOSTON, MASS.

THE occurrence of neuritis optici as a sequela of measles appears to have been so rarely observed, at least so rarely reported, that it may be worth while to put on record the three following cases. The neuritis can, indeed, hardly be regarded as a direct consequence of the disease of measles itself, it is rather to be looked upon as the result of a complicating meningitis. In two of the cases the evidence of the latter disease is patent enough, in the third, however, almost the only sign of cerebral affection is given by the ocular symptoms, and on this account especially is it of interest.

CASE I.—J. H. R., aged four years, was brought to the Massachusetts General Hospital, July 18, 1878, on account of loss of sight, first noticed the day before. He was the second of four healthy children, of healthy parents. The previous winter and spring he had had, occasionally, flushed face and headache, with sometimes vomiting. Aside from this he was well and strong. About the first of June his brother, and soon after his sister, had measles. Some two weeks after the brother was attacked this boy began to ail. For several days he was heavy, complained of headache, vomited, had epistaxis and cough; then a scanty eruption appeared. He was lightly sick some four days longer. The next fortnight he was about, and apparently as well as ever, but during the third week was in bed, face flushed, complaining constantly of headache, twitching in his sleep and starting awake suddenly, saying it hurt him when touched, and vomiting food. Once more he was up and about, seeming well. On the fourth day, however, when he came in to dinner after running about playing with a kite, his mother observed that he groped for his plate on the table. The plate was moved to another part of the table and the boy had great difficulty in finding it. During the following night he was very restless, eat nothing in the morning, and was brought to the hospital.

He was in very good flesh, had fair color, and, except his evident

blindness, showed no sign of sickness. The pupils were large, reacted but little to light. Only the movement of the hand at a short distance could be distinguished with either eye. In each eye the disk was prominent, with striated, grayish surface, the swelling hiding the outline of the disk, but not extending far beyond its border. The central vessels were visible on the surface of the swollen disk and curved sharply down its sides; the veins a little enlarged. No hemorrhages. Remainder of fundus normal. No urine could be obtained.

Two nights afterward there was great restlessness and unwillingness to be touched; in the morning headache and vomiting, and soon he became semi-comatose. Throughout the next day there was slight twitching of hands, feet, and mouth, and for several hours in the following night violent screaming. From this time he improved slowly, and after a fortnight seemed strong, had good appetite, gained flesh rapidly, and was bright and talkative.

On August 17th he was ruddy, stout, and apparently in excellent condition. Vision was entirely wanting; pupils insensitive to light. Swelling of the disks had much diminished, and the grayish striation was giving place to paleness. The outline of the disks was readily seen, though veiled. The arteries were somewhat small. Otherwise fundus normal. Urine normal.

During the next month his general health was very good and he still gained in weight; but he had, both waking and sleeping, occasional attacks of sudden fright, shrieking, with gestures of terror, and saying he saw pigs, dogs, or horses, becoming quiet as soon as touched by his parents.

September 21st, the disks had become sharply defined, white; the main vessels were rather small. Blindness continued. For six weeks longer there were a few attacks of fright, then they ceased. Only once during this time did he complain of headache. After the weather became cool and he was confined to the house he lost his ruddy color, but not his flesh, and had sometimes nausea and vomiting in the morning. Urine examined again in November, was normal. Examination of chest and abdomen negative. Toward the end of January, 1879, when last seen, the disks were a little more gray. There was no other change.

CASE II.—H. G., aged twelve years, was seen in consultation with Dr. H. E. Marion, to whom I am indebted for notes of this case, June 21, 1879. He was one of two children, a sister, younger, having partial paralysis of lower extremities since early in-

fancy. Parents healthy and in comfortable circumstances. The patient had had no serious illness till the present one. About Christmas, 1878, he had measles, from which he was supposed to have made a good recovery; but a month later, the last of January, 1879, he began to complain of occipital headaches, which were followed by vomiting and sleep. In March, headaches became more frequent, and he had often pain in different parts of the body; he began to lose flesh, was disturbed by noise, and would start out of his sleep as if frightened. This condition continued, and early in June it was noticed that he did not see objects readily. Dr. Marion saw him first June 19th, and found V. and F. much impaired; poor appetite, some constipation, urine normal; physical examination of lungs and heart negative.

Two days later I saw him. The pupils were rather large, reacted to light and A. V., R. $\frac{14}{40}$; L. $\frac{14}{200}$. The outer half of each F. was wanting; the inner half was contracted, particularly in the upper part; in the R. a defect of nearly the whole upper and inner quadrant. In both eyes, disks swollen, opaque, the sides of the swelling rather steep, the opacity extending some little distance into the retina, and shading off gradually. Numerous fine vessels on the disks; veins moderately enlarged and winding; both veins and arteries hidden here and there. Opacity a little more marked in L. Near the outer side of the swelling were several small whitish spots in R.; a few similar spots in L. Abnormal reflex in the macular region. No hemorrhages. The boy's walk was a little unsteady, as he said, because he could not see. No staggering with eyes shut and feet together. Dr. M. and I agreed in the diagnosis of meningitis.

For a few weeks headaches were less frequent, his appetite became good, and he began to gain flesh. Then he had severe intermittent pain in the temples, and darting pains about the head, with frequent vomiting. Toward the end of July he had a slight epileptic attack, followed by severe pain in the distribution of the left facial nerve. Noise disturbed him much. The first part of August, Dr. Williams and Dr. Minot saw him and agreed with the diagnosis already made. Sight failed till he could not distinguish light from darkness. August 19th, there was a circumscribed swelling over the anterior inferior angle of the right parietal bone which yielded to pressure, and resumed its shape when pressure was removed. A week later a similar swelling on the left side. He had some hallucinations of sight. Hearing became defective. At times there was severe pain

in the left mastoid region; later, in cartilage of left ear. By September 9th his head had increased in size by measurement. He had occasional convulsive movements. The scalp was tender. By the first of October he could scarcely walk alone; at times much fever; almost complete paralysis of rectum; much difficulty in passing urine. Appetite good, and he slept well.

From the last part of October till he died, December 24th, he was under the care of a Spiritualist in another city. Dr. Marion only learned of his death shortly before the funeral, too late to obtain an autopsy.

CASE III.—M. J. A., three and a half years of age, was sent to me by Dr. Howe, of Lawrence, April 29, 1880. Family history good: she fairly healthy. The last days of March she began to ail; the eruption of measles appeared on the seventh day. For two or three days before the eruption appeared there was high pulse and temperature, and some delirium at night. During the eruption she complained of headache for two or three days, not afterward. While the eruption was fading, marked convergent strabismus appeared, said by the parents to have been at first of both eyes, but more of the right. Shortly after the strabismus was noticed the mother observed that the child, when trying to pick up an object from the floor, would estimate its position wrongly.

For a week or two longer there was anorexia, constipation, and cough, afterward she seemed as well as usual. During the last few days before I saw her, the strabismus had decidedly decreased.

I found a moderate convergence of the right eye, and at least no marked deficiency of excursion. V. could not be determined with any accuracy. The disks were blurred, striated, little swollen; the opacity was enough to hide the outline of the choroidal opening, even with the reversed image, but not the central vessels, and extended over a space of some 2–2½ diameters of the disk. Central vessels of normal size. No hemorrhages.

The child continued well, slept well, gained in weight. When I saw her again, July 10th, the eyes were straight, and, the father said, had been so for six weeks. Every sign of neuritis had vanished; the disks were defined, bright, and of normal appearance. So far as could be determined in so young a child, V. was not affected.

The complication of measles by meningitis does not appear to be a frequent one; much more infrequent is it to have meningitis come on after a period of apparently normal convalescence from measles.

Given the meningitis, and the fact of neuritis has in it, of course, nothing peculiar.

In the first case the symptoms immediately preceding the outbreak of the eruption were hardly enough to have excited suspicion of serious cerebral disturbance; yet it may be that a meningitis existed from the first, becoming latent for a time, then bursting into activity, and again, after a second period of quiet, starting up with more violence than ever.

In the second case there is no history of cerebral symptoms with the attack of measles; only after a period of uninterrupted convalescence did such symptoms show themselves. The question might indeed be raised whether the meningitis was, properly speaking, a sequela of measles and not rather an independent affection. If the case stood alone one might scarcely feel justified in asserting any intimate relation between the two diseases. Taken in connection with other cases, however, remembering that in the first case reported there was a fortnight of apparent good health after not very marked head-symptoms, that this patient had been sick for several months before his history was obtained, and, possibly, some data may have been omitted by the parents, the assumption of direct connection between the measles and the meningitis does not seem unjustified.

The third case is chiefly remarkable for the almost total absence of symptoms of meningitis, except those to be observed in the eyes. But the occurrence of paralysis of the abducens, together with double optic neuritis, can hardly admit of a doubt as to this diagnosis.

REMARKS.

DR. POMEROY remarked that he had a case some time since in which there was atrophy of the nerve and neuritis. The symptoms came on soon after an attack of measles. The pain in the head was relieved by large doses of iodide of potassium, but the neuritis did not improve. The patient was lost sight of. Dr. Seguin, of New York, had seen the case in consultation and threw out of question the probable causation of measles. Both Dr. Pomeroy and Dr. Seguin agreed that there was basal meningitis.

A CASE OF DETACHED RETINA TREATED BY HYPODERMIC INJECTIONS OF MURIATE OF PILOCARPIN.

By DR. JOHN GREEN,

ST. LOUIS, MO.

MARY M., single, aged twenty-one, applied for advice June 13, 1880. Three months before she had noticed a defect in the upper part of the visual field of the right eye. Central vision had remained unimpaired until about May 1st.

V. $< \frac{1}{2}\frac{6}{0}\frac{}{0}$; fixing a point nine inches to the left and four inches above the centre of the test-letter V. $= \frac{1}{2}\frac{6}{0}\frac{}{0}$.

A map of the field showed the boundary line of the region of total blindness (as tested by seeing the pencil-point at a distance of twelve inches) passing $\frac{1}{4}$ inch above the point of fixation, and inclined about 160° to the horizontal meridian.

The ophthalmoscope showed a detachment of the retina in its lower half, extending to the level of the macula; near the posterior pole of the eye the detached retina was raised but little from the choroid, but in the lower part of the eye the separation was apparently not less than from two to three millimetres.

Subsequent examinations, made June 2d and 3d, confirmed the measurements of June 1st.

June 3d.—I injected 11 millig. of muriate of pilocarpin, dissolved in half a cubic centimetre of distilled water, beneath the skin of the right temple. Salivation began within two minutes, and became profuse within four minutes. Sweating began at about the same time as the salivation; it was quite decided four minutes, and profuse seven minutes from the time of the injection. The pulse rose in the first two minutes from 76 to 111, from which maximum it gradually fell to 100 in the course of half an hour, at which time the salivation and sweating had both sensibly diminished. At the end of an hour the salivation and sweating were over, but the pulse remained at about 90. The saliva was strongly alkaline, and the quantity ejected during the hour measured 120 c.c. No trace of myosis or of accommodative spasm could be detected at any time.

After the sweating and salivation had ceased, the eyes were care-

fully covered from the light by a bandage of linen covered by black silk. The recumbent position was preserved for two days, after which the patient sat up. The bandage was kept on for four days.

June 14th.—V. $= \frac{16}{200}$, central; fixing a point a little to the left of the test-letter, V. $= \frac{16}{128}$. A second map was taken of the field of vision, showing that the boundary line of the blind region had risen fully an inch (distance 12 inches).

The injection of pilocarpin was repeated, as nearly as possible as before, and was followed by the same train of symptoms. The patient was kept in bed two days and the dark bandage was kept on three days.

June 21st.—V. as per last record, but the map of the field shows the boundary line two inches above its position the week before, and over three inches above its position as observed on the 1st, 2d, and 3d of June.

A third injection was given June 25th; the patient was kept in bed two days, and bandaged three days.

July 6th.—V. unchanged from last two records, but the blind region has receded a little over two inches more.

July 10th.—A fourth injection was given; patient two days in bed, bandaged three days.

July 16th.—V. $= \frac{2}{1}$, central. A comparison with the map of July 10th shows a further recession of the blind region equal to half an inch, or a total of six inches since June 3d.

[1] [July 28th.—A fifth injection was given in my absence by my colleague, Dr. M. H. Post. A map made by him August 4th appears to show a loss of all that had been gained after the second, third, and fourth injections.

Sixth injection, August 9th, also by Dr. Post. August 16th, map shows a condition somewhat better than that of June 21st.

Seventh injection, August 31st, 10 millig.; patient two days in bed and three days bandaged.

September 7th.—V. $= \frac{16}{200}$, central; test-letter more clearly distinguished when a point nine inches to the left and four inches above the letter is fixed. Map of field shows the maximum recession of blind region ever attained, namely, eight inches from the position of June 1st, 2d, and 3d.

November 21, 1880.—V. $= \frac{16}{200}$, central, but improved in clearness by looking a little to the left and above. The map shows the posi-

[1] The continuation of the history after the date of the meeting of the society, up to the last observation of the patient, is given in brackets.

tion of the boundary of the blind region about midway between the positions observed June 21st and July 6th. The ophthalmoscope still shows extensive detachment with elevation of the retina in the bottom of the eye, but no detachment can be made out in the neighborhood of the posterior pole, where it was seen in the first examination made in the beginning of June.]

It may be questioned how far, if at all, the treatment in this case has been of positive utility; it was undertaken in compliance with the very urgent desire of the patient to have something tried for her benefit, and under the encouragement derived from a verbal statement to me by the late Dr. Rudolf Gebser, of St. Louis, that he had had the good fortune, apparently, to cure a positive case of retinal detachment by three hypodermic injections of pilocarpin, beginning with $\frac{1}{6}$ grain and increasing the dose to $\frac{1}{4}$ grain.

A noteworthy fact connected with the administration of pilocarpin, whether by the stomach or hypodermically, is the entire absence of any degree of resultant myosis or accommodative spasm.

REMARKS.

DR. PROUT wished to know what would have become of the case reported had it not been for the use of pilocarpin.

DR. GREEN replied that he was perfectly aware that cases of detached retina might recover without treatment. The interesting feature in this case was that a new portion of the retina had evidently recovered its function, in great part at least, after each of the four injections which had been made. The improvement seemed, however, to have been confined to those portions of the retina which had been elevated but little from the choroid. Where the subretinal effusion had been large in quantity no appreciable effect had been produced.

DR. KNAPP remarked that he had seen a patient who had been treated with pilocarpin and eserine by some European celebrity, and who now had a return of the disease.

DR. KIPP stated that he had used pilocarpin in a number of cases, and that in one instance it had been beneficial.

DR. KNAPP thought that the use of pilocarpin or eserine *in the eye*, in cases of detachment of the retina, was contra-indicated.

DR. WADSWORTH announced that he had used pilocarpin in two or three cases of opacities of the vitreous, without any apparent result.

DR. HENRY W. WILLIAMS, of Boston, remarked that since three years ago he had seen an unusual number of cases of episcleritis. There was one case in particular to which he would call attention. The disease had recurred more than once, and lasted for a long time, the patient recovering very slowly, with no special complica-

tions left behind. The young lady going to Europe, had there another attack, and de Wecker, of Paris, cut it short by the use of pilocarpin injections hypodermically. During the summer of 1877 Dr. Williams had seen de Wecker make these injections, and on returning home he had tried them upon several cases with much success, cutting short the attack to a period of two or three weeks. Subsequent experience had confirmed his good opinion of the remedy, and he could add his testimony in favor of its value in that affection.

EXHIBITION OF A COMBINATION SET OF TRIAL-GLASSES, AND A NEW TRIAL FRAME.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

Two years ago I called attention, in this place, to the insufficiency of even the fullest trial cases of glasses for the accurate measurement of the higher grades of ametropia. Assuming that the common interval between the successive glasses ought not to exceed .5 d. in the higher numbers (say from 4.5 d. to 20. d.), or .25 d. in the lower numbers (say from 0 to 4.5 d.), a full series will contain 50 numbers. Many of these numbers are, however, not to be found in commerce, and must, therefore, be somewhat difficult to procure, as well as costly.

I showed, also, that by making a slight change in the construction of the ordinary brass settings of the glasses and of the trial frame, it is both easy and convenient to employ glasses in dual combinations, both spherical and cylindrical, and thus to reduce the glasses in the trial-case to a comparatively small number, and those such as can be readily and cheaply procured.

I have now to exhibit two metric trial-cases which I have had made for me, the one by Mr. H. W. Hunter, of New York, and the other by Messrs. Jas. W. Queen & Co., of Philadelphia.

In the former case, made by Hunter, there is but a single glass of each number, viz.:

+ .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8., 12., 16., 20.
— .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8., 12., 16., 20. } spherical.

+ .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8.
— .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8. } cylindrical.

46 glasses, of which 26 are spherical and 20 cylindrical.

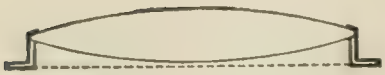


FIG. 1.

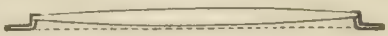


FIG. 2.

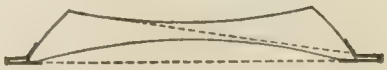


FIG. 3.

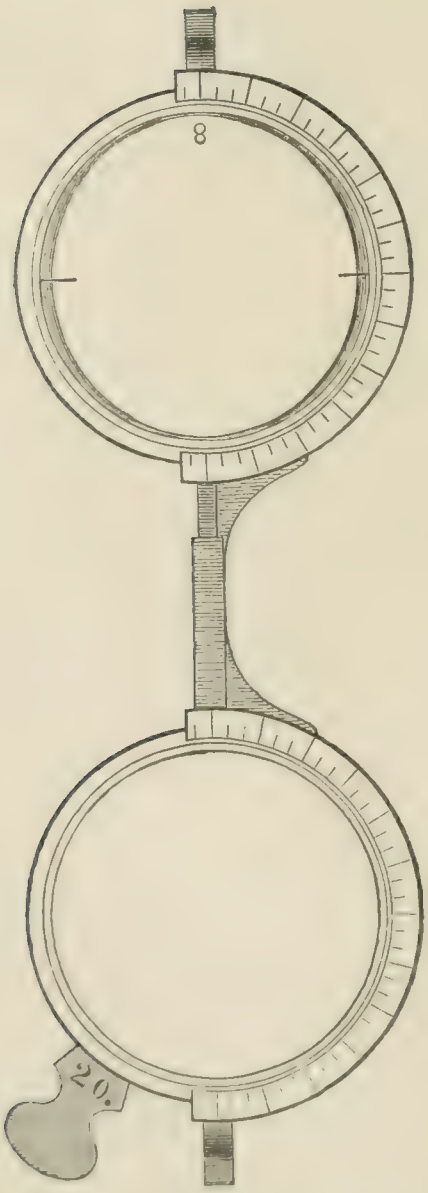


FIG. 4.

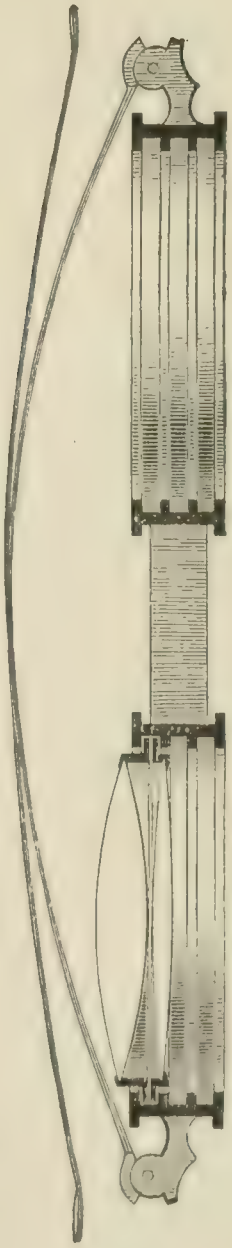


FIG. 5.

The second case, made by Queen & Co., contains the same numbers, but the spherical glasses are in pairs. It contains, therefore, 72 glasses, of which 52 (or 26 pairs) are spherical and 20 cylindrical.

The construction of the brass settings for the glasses is indicated in Fig. 1, which shows a section of one of the stronger convex glasses (20. d.), together with its setting. This is made of such a depth that the plane of the flange just avoids contact with the centre of the lens surface; the flange also is much thinner and deeper than usual. Fig. 2 shows one of the weaker convex glasses, and Fig. 3 a concave glass of 20. d. Fig. 3 illustrates also the mounting of a prismatic glass. By this construction any two lenses from the case may be placed together, flange to flange, without contact of the glasses, and in this position they may be placed together in either of the three grooves of the trial-frame.

The trial-frame, Figs. 4 and 5, is made in the form of two short tubes, from the upper part of which nearly, but not quite, one-half has been cut away; those half-tubes, which are united by an adjustable bridge, are grooved upon the inside so as to present three rather broad grooves, each of which is designed to receive and hold the flanges of two glasses. The three grooves are sufficient for the reception of four of the thickest glasses of the case, say the $\pm 20.$ and $\pm 16.$ spherical, and the $\pm 8.$ and $\pm 4.$ cylindrical, in which case the combination of strongest glasses will be placed in the groove next the eye, and the second couple in the front groove. In other cases the glasses may be placed in the first and second, or in the second and third grooves at pleasure, according to the distance at which it is desired to set them from the eye.

THE KERATOMETER—A NEW INSTRUMENT FOR MEASURING THE CURVATURE OF THE CORNEA.

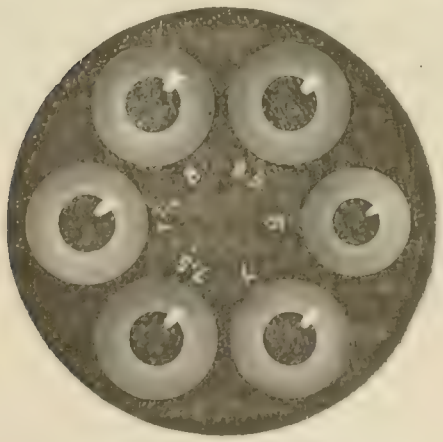
By DR. E. G. LORING,

NEW YORK.

BEAUTIFUL and accurate as is the instrument designed by Helmholtz for measuring the curvature of the cornea, it is nevertheless true that it has been of more value to physiology and science than to practical medicine: first, from the elaborate and expensive character of the instrument; and secondly, from the amount of technical knowledge and experience necessary to obtain with it accurate and satisfactory results.

The practising oculist, therefore, has hitherto had nothing with which he could measure or even form any idea as to the degree of curvature of the most important refracting surface of the eye.

It is to supply this want that the simple and inexpensive instrument now to be described was designed. The instrument consists of a metal disk, in which are set a number of plano-convex lenses of various curvatures, on the plane or posterior surface of which the representation of the iris is painted. The lenses are, in fact, anterior sections of artificial eyes of different curvatures. The number of lenses employed in the present instance is six, but more could be inserted if a smaller interval between them was needed. The radii of these artificial cornea are, progressing from the longest to the shortest: 8.5; 8.; 7.$\frac{3}{4}$; 7.5; 7.; 6. The manner in which they are set is shown in the accompanying drawing.



As will be seen in most cases, the difference in length of radius or interval between the glasses is equal to half a millimetre. As, however, the radius of the cornea of the vast majority of eyes must lie between 7.5 and 8 mm., this interval has been so subdivided as to give

between these two numbers a difference of radius of one-quarter of a millimetre, or less than $\frac{1}{100}$ of an inch. As, on the other hand, a cornea of less than 7 mm. can only occur as a rarity, the interval between this and the next succeeding glass is 1 mm. The length of the radii is stamped below the glass.

The principles upon which the instrument is based are: first, that the eye is capable of detecting very minute differences in the size of two juxta-opposed bodies, the exact dimensions of which the mind is unable to estimate accurately; secondly, that the size of an image from a convex surface is proportionate to the radius of curvature.

The application, then, of these principles consists in comparing the image of the glass cornea, which has a known radius, with that from the real cornea, which is unknown; or, in other words, in matching the image of the real with that of the artificial eye. When the images are of the same size, then the radii must also be the same.

The application of the test is exceedingly simple. Any object may be taken from which to get a reflected image from the cornea, as, for example, the ordinary window-sash, especially when the white shade with which it is usually provided is drawn down. The patient is placed opposite to this in a chair, and the observer, standing a little on one side, so as not to interpose his body or head between the light and the patient, then places the disk in close application to the outer angle of the eye to be examined. Should the image from the glass selected not correspond in size with that from the cornea, the observer then rotates the disk until the image from the glass is the same size as that from the eye. Let us suppose that the observer begins with the first lens—that is, the one with the longest curvature, 8.5 mm. He at once sees that the image from this is a great deal larger than that from the real cornea. He turns to 8, and still finds that, though nearer in size, it is still too large. He turns again to 7.$\frac{5}{4}$, the image from which corresponds exactly in size with that from the eye examined. He knows, therefore, that the radius of this must be 7$\frac{5}{4}$ mm., which is that of the average normal eye.

Or, supposing the observer has to deal with an eye which has a shorter curvature than usual. He finds that 7.5 gives too large an image, while that from 7. is too small. It follows that the radius must lie between the two, or 7.$\frac{1}{4}$ mm.

As with all other instruments, attention to some few points increases its efficacy. For example: in order to bring out the difference in size of the image, where the discrepancies in the length of

the radius are small, it is necessary to have an object of sufficient size, as, for example, a window; and the patient, for this reason, must sit near enough to get a large-sized image on his cornea, say not more than six or eight feet away, and his gaze should be so directed that the image of the window-frame shall fall upon the centre of his cornea. The same condition should be obtained for the artificial eye by a slight tilting movement of the hand, if necessary. It is better, also, to have the light subdued, and only from one window, and better still to have the blinds of this one closed, or the shades drawn. By subduing the light the pupil does not contract so much, and the contrast between the brighter image and the rest of the cornea is more marked.

Better, even, than the actual window for a test-object, is the reduced representation of one made as a transparency, behind which a lamp is placed. The writer uses a framework of light wood, a foot square, covered with the thin tracing-cloth used by architects and artists, and which, by the way, makes the best transparencies for all optical screens. The sides of the transparency should be about six inches deep, so as to get as even a dispersion of light by irregular reflection as possible. As there is but one source of light, there are no disturbing influences from cross-lights, and the image of the screen comes out on the cornea sharply cut and brilliantly illuminated.

In this case the patient sits not at a distance, but close to the box or screen—at about two feet from it. Care should be taken to have the reflex or image fall in the centre of the pupil, which is readily accomplished by having the patient look at the centre of the box where some slight mark can be made to serve as a guide. The wider the pupil the better; and if the observed eye is under atropine, so much the more satisfactory is the result. After a little experience it is not necessary to pay so much attention, either to the size of the object or the position of the patient, as a glance suffices. Even from a distant object, moreover, the farther the object is from the patient the less difference it makes whether the disk is exactly on the same plane as the eye, though this should always be carefully aimed at.

Two questions arise in regard to the instrument: the first is, whether differences in curvature of the cornea exist sufficiently often to make it necessary from a practical, or even interesting from a physiological point of view; the second is, whether, if such differences exist, the instrument is capable of determining them with sufficient accuracy. That the radius of the cornea differs in different

eyes, even where the sum total of the refraction is the same, I believe occurs very much more frequently than has been taught, and that future examinations will show this to be the case I have no doubt. Eyes may still be emmetropic and yet vary among each other as to the radius of their cornea, these variations being counterbalanced by other variations in the refracting power of the lens or length of axis.

The opinion that the anterior portion of all eyes is mathematically, or almost mathematically, the same, would seem to have been founded on altogether too small a number of eyes, while on the other hand the average results of different observers on eyes supposed to be emmetropic show too great discrepancies to warrant any such conclusion.

As to the accuracy of the test, it is not claimed that it is as great as that of the ophthalmometer, nor is it proposed to substitute the one for the other; still it is claimed that a difference of one-fourth of a millimetre, or less than one-hundredth of an inch, in a radius, can be detected with certainty and despatch, while it must be remembered that differences in the radius of the normal eye have occurred with different observers from 7.85 to 7.4, or nearly one-half a millimetre. No such difference as this could occur with this instrument without being at once detected. Indeed, as the writer knows from experience often repeated, a person with a good and accurate eye can tell the length of a radius within one-eighth of a millimetre, or $\frac{1}{200}$ of an inch.

Moreover, the fact that different observers have made the average radius of the normal eye so different, shows conclusively either that the radii of different eyes of the same refraction differ, or that there is a great want of accuracy in the method itself or in the work of the observer.

It may be objected that the lenses in this instrument would have to be ground with great accuracy, and this is perfectly true; but the necessary accuracy is merely a question of care on the part of the optician, as a given radius can always be obtained within one-tenth of a millimetre (or $\frac{1}{254}$ of an inch). This discrepancy, even if it existed, could be neglected. Moreover, the images formed by the series of lenses do not bear as close a proportion to each other as would at first sight appear. The proportion between 8.5 and 8 is as 17 to 16, while that between 8 and $7\frac{3}{4}$ is as 32 to 31. Even this difference, which is the smallest, can be readily told if the image be of sufficient proportions, and this can always be obtained, as described above.

As has already been said, the interval between the lenses might readily be reduced by increasing their number. This would simply increase the size of the disk. A better way, perhaps, of arriving at the same end, and giving the observer a larger selection of lenses, and therefore a nicer and more accurate admeasurement, is that of having two disks instead of one with the same interval of half a millimetre between each lens, one disk to progress on the half-millimetre, and the second disk on the quarter-millimetre. The first series then would run 8.5, 8, 7.5, 7, 6.5, 6. The second, $8\frac{1}{4}$, $7\frac{3}{4}$, $7\frac{1}{4}$, $6\frac{3}{4}$. $6\frac{1}{4}$, $5\frac{3}{4}$. Combining the two series, we have a continuous series with an interval of only one-fourth of a millimetre between the lenses. The advantage of this is, as the radii of the lenses of each disk have an interval of half a millimetre, the difference in the size of the succeeding images is very conspicuous, while by using the two disks the difference in the radius of only a quarter of a millimetre can readily be determined. For example: supposing that the observer in a given case tries 8.5. The image of this he finds too large, while that of 7.5 is as much too small. He knows, then, that the radius must be between the two, and he then tries the other series, and finds the correct radius to be $7\frac{3}{4}$. Thus, the observer has a coarse and fine adjustment, with a sufficient interval between each glass to get an image of sufficient size not to occasion any confusion.

The instrument has proved in the writer's hands not only of interest physiologically, but in some cases of practical advantage, especially in high degrees of astigmatism, simple or mixed, and in some cases of great amblyopia, evidently of congenital origin, where by its use it was at once shown that the condition of the cornea had nothing to do with the defect in vision. In some cases of refraction, too, was it of advantage, or, at least, of interest. Thus, it was assuredly of interest to see that in one of the most marked cases of hypermetropia (H.$=\frac{1}{2}$), the cornea, instead of having a longer radius than usual, had a much shorter one, it being a little more than 6 mm.

In another case of myopia of a $\frac{1}{6}$ the radius of the cornea was only 7 mm., while in another case of a myopia of $\frac{1}{2}$ the cornea had a radius of over $8\frac{1}{2}$ mm. In the most marked case of microphthalmos which the writer has ever seen, and where the diameter of the cornea was only $7\frac{1}{2}$ mm., the radius of curvature was found, contrary to all expectations, to be about that of the normal eye.

Moreover, children of any age, even infants in arms, can be readily examined, and thus an idea formed of the changes which take place in the various stages of development from infancy to old age.

The instrument ought also to be of use in solving the question in a given case, whether the myopia or hypermetropia was corneal or axial.

The instrument was not designed for the admeasurement of astigmatism, but the more pronounced degrees are easily recognizable, though it is difficult to detect the existence of less than $\frac{1}{24}$. Where a sufficient quantity exists, the reflex from the cornea of a square object, such as the screen already described, is no longer exactly a square, but a parallelogram with one dimension perceptibly larger than the other, so that if the image from the artificial eye corresponds with that from the cornea in breadth it does not in length, and, *vice versa*, if in length, then not in breadth.

Here, too, we should be able to tell, when the astigmatism is of a considerable degree, whether it was corneal or lenticular.

The comparative brilliancy of the images of the cornea and the keratometer is also a matter of interest.

In the young or adult normal eye the reflex from the cornea is more brilliant than that from the artificial eye, while in old age and in some diseased conditions the reverse holds good, and the reflex from the artificial is brighter than from the natural eye. This is the case where from any cause the epithelial layer is not as transparent and highly polished as it should be. I have even had my attention called, when experimenting with the instrument, to the existence of very faint and smoke-like opacities which had escaped my notice, and the diminished brilliancy of the image ought to show itself in any pathological condition in which the lustre of the cornea was reduced. This would occur, for example, in certain forms of keratitis, or wherever the circulation and transudation of the corneal fluids were interfered with either through increased or decreased intra-ocular pressure, as, for example, in certain forms of glaucoma on the one hand, or choroidal affections on the other.

In all cases the corneal reflex, both of the natural and artificial eye, can be magnified by a hand-glass or telescope: but this subtracts materially from the simplicity of the method, while it does not add materially to its exactness.

AN INSTRUMENT FOR THE DETECTION OF COLOR-BLINDNESS.

By DR. WILLIAM THOMSON,

PHILADELPHIA, PA.

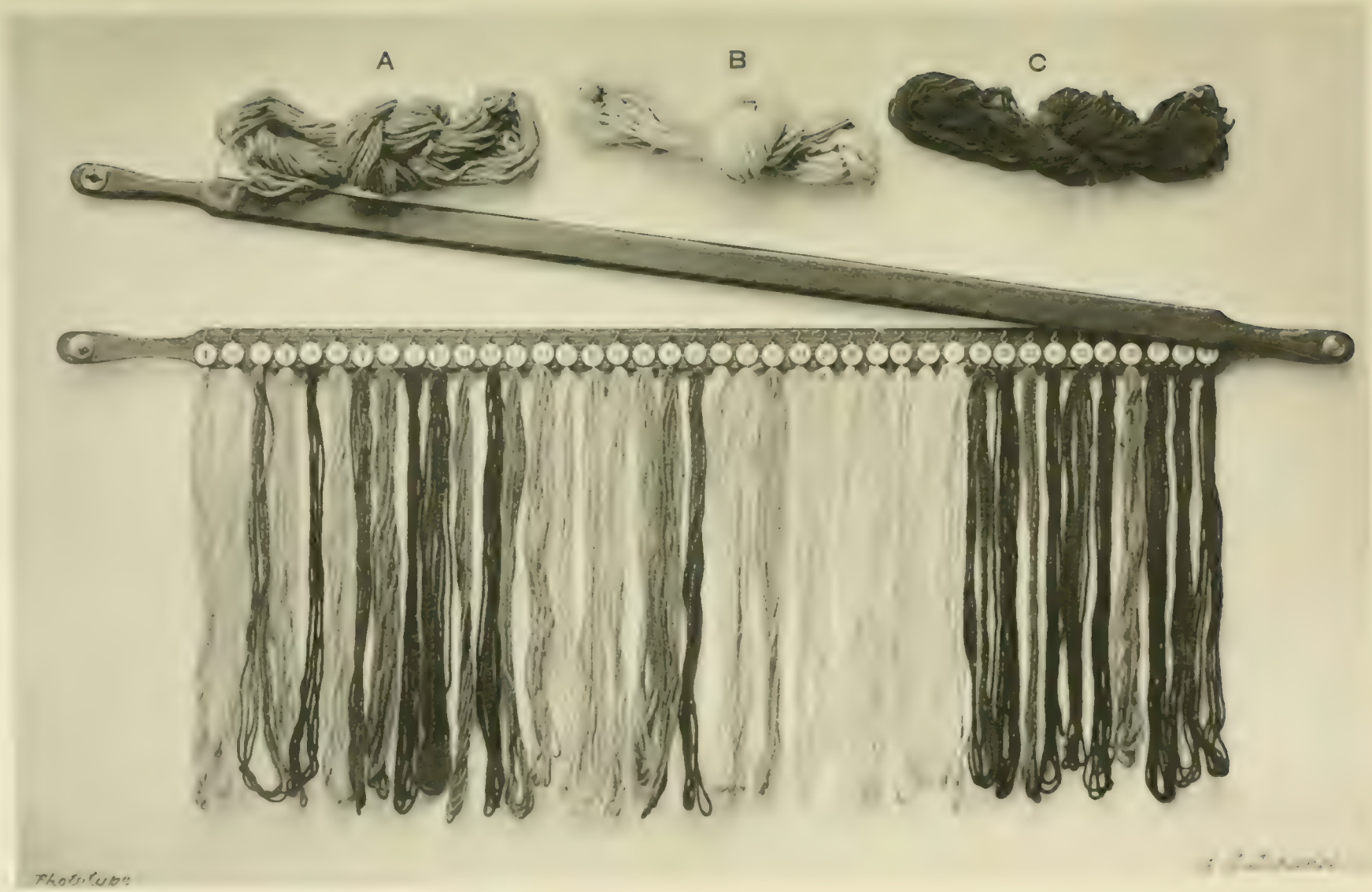
(With Photograph.)

HAVING been invited to give advice and assistance to the management of the Pennsylvania Railroad in its examination of its employees as to sight, color-sense, and hearing, I was led to use this modification of Holmgren's method by these facts: the number of employees to be examined is thirty-five thousand, scattered over more than twenty-five hundred miles: the number of trained ophthalmic surgeons is limited and not sufficient to make these examinations in any reasonable time, collecting the facts, and deciding judicially upon them. I felt compelled to suggest some system which would enable the facts to be collected by any intelligent employees in the company's service, in such a form as to enable decisions to be justly made by scientific experts, although personally absent from the examinations.

For color-blindness I have used in this manner, for two thousand examinations, an instrument consisting of two flat sticks about two feet in length and one inch in width, fastened by a hinge at one end, and connected together by a button at the other. Between these and concealed from view, are forty white buttons, having the figures from 1 to 40 clearly engraved on them, attached to the stick by small wire hooks, which will permit of their easy removal or change of position. To the eyes of these buttons are attached forty skeins of colored wool.

In obedience to Holmgren, the test-skeins are three: 1, light green; 2, rose or purple; and 3, red. These skeins are shown to the persons examined in turns, and they are directed to select from the stick the colors which will match them.

On the stick the colors are arranged alternately to match the tests, and to be of those confusion-tints which experience shows to be most commonly selected by the color-blind. The first twenty tints are therefore green, and gray and tan-colored confusion-tints, and this part suffices for detecting any color-blindness.


A
B
C

From 21 to 30 the tints are alternately rose and blue; and from 31 to 40 the tints are red, and its confusion-colors brown or sage, etc.

When the examination is made, the instrument is closed to conceal the figures, and test-green being shown, the person examined is directed to select ten tints from the stick; and when this is done the figures are recorded by a clerk, and the selection thus made can be identified at any future time.

It is arranged, however, that the real tints commence with figure 1, and range onward by the odd figures, while the confusion-tints are designated by even figures, so that, when the entire examination is concluded—in a case of normal sight—only odd figures should appear recorded on the blank, whilst if a fault has been made by a color-blind person, it will be revealed by even numbers. In the green test the appearance on the blank of numbers beyond 20 would be more than suspicious; with the rose, anything below 21 or above 30; and with the red, any number below 31. It will be seen that any superintendent or supervising expert could thus be sure of the presence or absence of color-blindness by remembering the simple theory of the arrangement, and scanning the blank on which the numbers of the tints selected had been recorded.

The first 20 tints are green and confusion-tints, but the color-blind has the whole 40 to choose from, and does frequently select reds at the end of the series, and thus proclaim his defect. Again, of these confusion-tints, 5 are gray, and 5 shades of brown, and we may thus guess at red- or green-blindness by the first mistakes of the color-blind—those green-blind preferring grays, and the red-blind selecting the browns.

In the rose-test, between 21 and 30, the green-blind frequently select greens in the first series, and show thus their defect.

From practical experience of over 2,000 examinations by non-professional but intelligent employees, we are satisfied that all color-blind persons have been detected, since over $4\frac{2}{10}$ per cent. are clearly so defective from the examination of the separate reports. This brief description of the instrument is inadequate, but may serve to show how this subject has been rendered of practical use to the public who travel, and to the railway directors, by making the elimination of color-blind employees easy.

REMARKS.

Dr. Jeffreys could not approve of the use of the tests by the laity.

Dr. Thomson said that the colors used by him were confusing

colors, and that he had selected them after many examinations. He thought they answered the purpose very well indeed, and that even with a less number of colors we could eliminate the four per cent. of. color-blind employees.

THE PRESIDENT remarked that it would evidently not fall to the Society to recommend any particular methods, but it could express its opinion upon the subject. Resolutions relative to this would be received and acted upon. It would be desirable that those interested in this matter should communicate their views in some form to the corporations.

A MODIFICATION OF LORING'S OPHTHALMOSCOPE.

BY DR. HENRY D. NOYES,

NEW YORK.

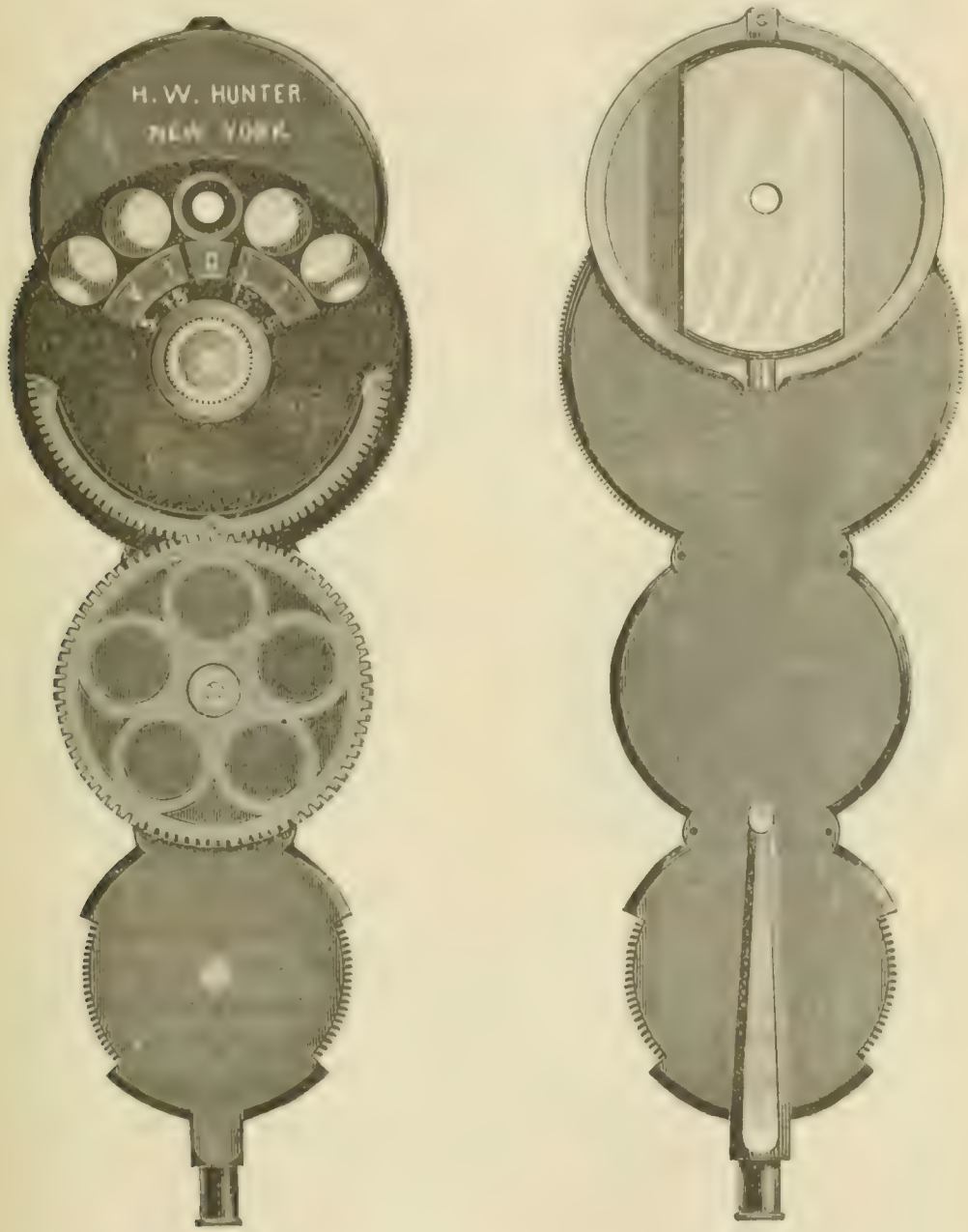
THE instrument figured on opposite page has only this claim to existence, that it furnishes a means of bringing before the eye a large series of glasses in rapid and uninterrupted succession, in a manner which the writer has found more convenient than any other. The contrivance for this purpose is a cog-wheel system, and this has been employed by Dr. Loring, although not in this manner, and such instruments have not been on sale.

In developing this feature it has been found that two wheels geared together would serve the best purpose for the rotation of the front or primary disk, while a single wheel is employed for the back or secondary disk. The effect is, that for the front disk the acting wheel, viz., the bottom one, is moved in the same direction as the movement of the disk. For the back disk the acting wheel causes a reverse motion.[1]

To prevent the beard of the observer or patient, if either be so adorned, from being caught by the wheels, the upper one of the pair is perfectly covered up, and the lower one is exposed for a part only of each side. The single wheel is open and has not been found to

[1] In accordance with a suggestion of Dr. Prout, of Brooklyn, the position of the convex and concave glasses on the back disk is made the reverse of the arrangement on the front disk, and the effect is that in turning it the finger may act in the same direction as for the front disk. In the front disk the convex glasses are on the left side, on the back disk they are on the right side.

give any annoyance. To balance the instrument a long and unusually thick handle has been adopted. The optical features are those of Loring's last model, including the tilting mirror, which is also set

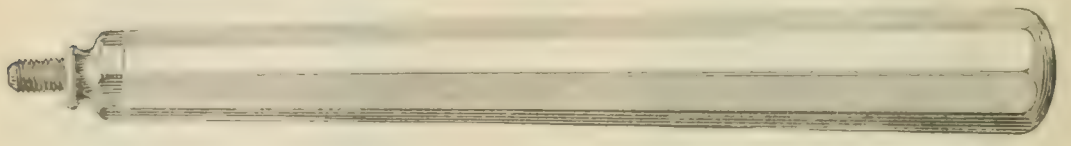


in a ring that permits it to be rotated to various positions, as was done in the original invention of Helmholtz.

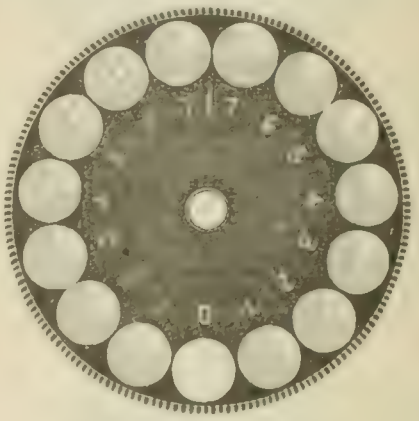
There can, therefore, be little claim to novelty in the instrument; yet, inasmuch as Dr. Loring never saw fit to advocate the suitableness of employing cog-wheels, the writer has been led to experiment

with them. The instrument, as presented, has been in use for months, and has fulfilled all that can be desired.

Its mechanical facility has given added worth to the admirable optical contrivances of Dr. Loring's instrument, and an ophthalmoscopic examination is by its aid performed with quickness, thorough-



ness, and comfort. One point may be adduced as worth observation. By using the secondary disk with +15 D. one may scrutinize the front of the eye, including the lens and anterior part of the vitreous, and then either turn on the series of concave lenses of the primary disk to explore the deeper parts of the vitreous, or, turning



off the secondary disk, be placed at once in view of the fundus, providing the eye be approximately emmetropic. To gain the better command of the instrument by the cog-wheel system has seemed, by the writer's experience, to fully justify the additional appliances. The parts are figured of exact size, and the weight is 80 grammes.

AN IMPROVEMENT IN CONCAVE SPECTACLE-GLASSES OF HIGH POWER.

By DR. JOHN GREEN,

ST. LOUIS, MO.

CONCAVE glasses in the higher powers are clumsy and heavy, in consequence of their great thickness in their peripheral portions; yet the periphery of the glass is practically never used.

By making the principal refracting surface small, say two centimetres in diameter, and grinding it upon one side only—that turned toward the eye—of a double-convex, double-concave, plano-convex, plano-concave, or plane glass, a single grinding tool may be made to yield lenses of any desired focus, within a range of say eight dioptrics and with intervals not exceeding $\frac{1}{4}$ d., or even $\frac{1}{8}$ d.

Glasses ground in this manner are very light, and they are all, in some degree, periscopic; those ground upon convex lenses are true menisci.

The accompanying figure shows sections of three such glasses, ground with a tool of −20. d. (about one Paris inch radius) upon a double-convex, plane, and plano-convex lens respectively. The double-convex lens is of the value of 8. d. (radii of about five Paris inches); the value of its anterior surface is therefore equal to +4. d., and the value of the lens is equal to +4. d. − 20. d. = − 16. d. In the plano-concave lens the value of the combination is, similarly, − 4. d. − 20. d. = − 24. d.

By thus combining the single concave surface, −20. d., with the anterior surface of any double-convex or double-concave lens between the limits + 8. d. and −8. d., or of any plano-concave lens between the limits 0 and −4. d., we can easily command a series ranging from −24. d. to −16. d., with a common interval of .5 d.,

or even .25 d. Similarly, a concave surface of −16. d. (about $1\frac{1}{4}$ Paris inch radius) will yield a series ranging from −20. d. to −12. d., with the same common interval of .5 d. or .25 d.

I have to exhibit two pairs of spectacles, made after my instructions by Mr. A. P. Ecker, optician, of St. Louis. The concave surface of −16. d. is ground in the one case upon one side of a double-convex lens of +8. d., giving a combination equal to +4. d. −16. d. = −12. d., and in the other case, upon a plano-concave lens of 1.5 d. giving a combination equal to − 1.5 d. −16. d. = −17.5 d. In the second pair of spectacles the edges of the glasses are grooved, and the weight does not exceed that of a pair of ordinary spectacles of −1.5 d.

AN ACUTE GLAUCOMATOUS INVASION, FOLLOWING CLOSELY UPON A SINGLE APPLICATION OF A VERY WEAK PREPARATION OF DUBOISIA.

By DR. JOHN GREEN,

ST. LOUIS, MO.

CASES of acute attacks of glaucoma, seemingly induced by the use of atropia, are sufficiently common. A similar attack has recently followed, in my hands, upon a single application of duboisia.

Mrs. B., widow, aged sixty-seven, lost her right eye six years ago from acute glaucoma, which was for a time mistaken and treated for neuralgia. The eye has remained free from pain since recovery from the acute attack, and is now soft, with a dilated pupil, a shallow anterior chamber, and an opaque lens.

June 7, 1880.—She called on me with the statement that vision had been failing for more than a year, but that she had had no pain. Examination showed Hm. $\frac{1}{16}$; V. $\frac{1}{60}$; pupil not at all dilated; anterior chamber shallow; T. +?

June 11th.—I ventured to dilate the pupil by means of a small bit of paper impregnated with duboisia extract, using a piece of such size as I have found ordinarily to produce a medium grade of mydriasis in from thirty to forty minutes.

The ophthalmoscope showed a shallow depression of the outer

half of the optic disk, with the *lamina cribrosa* plainly visible through the transparent floor of the excavation. Elsewhere the disk was somewhat swollen; the retinal veins were full, and there were a few hemorrhagic streaks in the retina radiating from the disk.

Two hours after the examination pain came on, and continued "off and on" during the night. It was very severe at times, and was attended with nausea and vomiting. I was not informed of the attack until the next day, at which time the eye presented the usual appearances of acute glaucoma: globe very hard; pupil widely dilated; anterior chamber very shallow; media clouded; vision reduced to the ability to see the hand at one foot distance, but not to count the fingers.

A vigorous course of myotic applications was commenced—Calabar extract alternating with pilocarpin muriate—under which the pain, mydriasis, and cloudiness of the media rapidly diminished, and vision promptly improved. On June 18th the eye had nearly recovered its appearance as it was before the recent attack: Hm. $\frac{1}{20}$; V. $\frac{16}{20}$. The pupil was a little elongated horizontally, and the anterior chamber was perhaps a little shallower than before the attack.

Under the continued use of pilocarpin muriate ($\frac{1}{60}$), dropped into the eye from four to six times a day, the eye continued to improve up to the day of the last record, July 13th, at which time I found Hm. $\frac{1}{160}$, V. $\frac{16}{30}$, tension+?, anterior chamber not appreciably shallower than when first seen five weeks before; the pupil was still a little elongated horizontally, and it was not possible to produce full myosis by the use of Calabar extract.

NOTE.—October 20, 1880.—After July 13th there was observed a gradual falling off in the acuteness of vision, which remained at $\frac{1}{200}$ from August 2d to September 4th. September 15th it had fallen to $\frac{16}{200}$.

September 28th the eye showed signs of a new attack of acute glaucoma—increased tension, severe pain, and shallowing of the anterior chamber. Iridectomy was performed September 30th.

October 10th I obtained a fairly good view of the fundus, in conjunction with Dr. A. Alt, who was visiting St. Louis. The whole disk appeared gray and opaque, with very little appearance of excavation; the hemorrhagic streaks in the retina had wholly disappeared, and a rather large fixed opacity was seen in the vitreous above and anteriorly. Since that date the tension has increased and no further view of the fundus has been obtained.

REMARKS.

DR. E. WILLIAMS had had one case in which there was a previous history of glaucoma and loss of the other eye, and in which there

was a history of hemorrhagic retinitis. We all knew how liable glaucoma was to develop under such circumstances. The mere fact that glaucoma came on so soon after the use of duboisia, especially with so weak a solution, he did not think was sufficient evidence for its being considered as having anything to do with the causation of glaucoma.

DR. KNAPP thought that mydriatics should always be avoided when there was any predisposition to glaucoma; he thought it was safe to adopt this rule. The cases were too numerous where glaucoma had occurred soon after the use of mydriatics.

DR. GREEN remarked that it was this fact which caused him to use a weak preparation of duboisia. He believed that the attack was directly provoked by the application.

DR. E. WILLIAMS remarked that he was glad that a rule had been given in reference to the use of mydriatics. But just a few days before he left home he had under treatment a patient, a young man, in whom a small ulceration of the cornea occurred about midway between the centre and periphery, resulting in complete perforation without prolapsus. When he became convinced of the existence of perforation he resorted to the use of eserine, and kept the pupil contracted. The aqueous humor escaped, and the ball was moderately soft. The wound did not close. He made one instillation of a four-grain solution of atropine, and the pupil was dilated, the aqueous being retained.

DR. WADSWORTH had for a long time been of the opinion of Dr. Williams in regard to the causation of glaucoma. He had regarded its occurrence as co-existent with the use of certain remedies rather than caused by them. Recently he had had a case which it was perhaps proper to call hemorrhagic glaucoma, in which the disease had certainly not seemed to be increased by the use of atropine. The patient, a lady near seventy, when first seen had numerous hemorrhages of the retina; there was no pain, no increased tension. Two months later, severe pains suddenly came on. When seen two days afterward, there was increased tension, and so much turbidity of the media that no reflex could be got from the pupil. He gave atropine and the pain diminished for a few days, but returned while the patient was still using atropine, and the eye was enucleated. A case under his care some years ago was of interest in this regard. A woman came to the hospital complaining of pain in and about one eye. There was circumcorneal congestion, and one or two narrow posterior synechiæ. Atropine was applied. Half an hour later the pain was relieved, and an ophthalmoscopic examination revealed strong arterial and venous pulsation and large central excavation. T. was increased. On inquiry into the history it was learned there had been short glaucomatous attacks during the past five months, of late at intervals of less than two weeks. In accordance with the prevailing opinion, the patient was now warned against the use of atropine; but on a subsequent attack, ten days later, she did use atropine herself, and again with relief of pain. An iridectomy stopped

the attacks, at least during four months that the case was under observation. In this case, it is true, there were one or two synechiæ, but the attacks she had had were all sudden and of short duration, with nothing to point to a previous iritis as the origin of the synechiæ.

DR. RISLEY remarked that he had already put upon record a case of posterior synechia where atropine aggravated the pain, but duboisia relieved it at once. Duboisia quieted the pain in two subsequent attacks.

AN IMPROVED OPERATION FOR A NEW PUPIL AFTER CATARACT OPERATIONS.

BY DR. EDWARD G. LORING,

NEW YORK.

WHEN, after an operation for cataract, the pupillary space becomes closed through inflammatory processes, it becomes necessary to open this by what is known as a secondary operation, but which is often, if not usually, a more serious undertaking than the original operation; how serious, indeed, is shown by the repeated operations which become necessary in order to establish an opening and to counterbalance the ever-recurring and almost irresistible tendency to a subsequent closure—operations which, from their very frequency and inherent violence, often lead to a total loss of the eye.

The means by which these openings through the denser membranes are usually made consist either in a simple iridectomy, or in this combined with the section of the iris *in situ* by means of scissors, as, for example, those of Wecker. But both of these methods are open to grave objections, which are only too apt to defeat the object of the surgeon, and to cause the operation to fail even where success seemed to be most apparent. For, even with a simple iridectomy, a large external wound must be made in order to give sufficient play to the arms of the forceps, as one of the chief, if not the chief, reason why a failure to grasp the iris takes place is because the opening-wound is too small. This necessity of making the external wound of sufficient size is, however, in itself a source of great danger, no matter how smoothly the operation may have passed off, for the inflammatory reaction which accompanies the closure of the wound is apt to propagate itself to the iris, already the subject of inflammatory

processes, and a new attack is lighted up, to be followed by even a firmer closure of the pupil than before. Thus, the apprehensions arising from the external wound alone are neither light nor to be disregarded; but, when to these are added the difficulties in seizing the iris, the tension required to draw this through the wound, the great danger of rupturing the hyaloid, the loss of vitreous, and the occurrence of the deeper-seated and oftentimes violent hemorrhages, we have one of the most difficult and harassing positions in which the ophthalmic surgeon can be placed.

Nor is this all, for it often happens that this secondary operation for iridectomy passes off with perfect success. A large piece of the iris is excised, and the pupillary space presents a uniform and promising blackness. Moreover, the convalescence is perfect and unretarded, while the eye, when the bandages are removed, presents a very favorable aspect; but, unfortunately, to the grief of the patient and the surprise and mortification of the surgeon, vision is no better than before the operation, and a thorough examination now reveals the fact that the iris has come away, leaving behind it a thickened and deep-seated membrane covered with uveal pigment, which, surgically speaking, is harder to deal with than before the iris was removed.

Nothing remains to be done under these circumstances but a needling operation, which, from the widely extending ramifications of the membrane, and its connections with the ciliary body and hyaloid membrane, is both difficult and dangerous. It is to avoid these numerous and, as a usual thing, inefficient operations, that it has been proposed to attack these membranes from the beginning with scissors, with the hope of excising a piece of sufficient size to insure a permanent opening. This proceeding, to which are added, besides the dangers of simple iridectomy, the almost unavoidable loss of a large quantity of vitreous, is so grave in its nature, and so disastrous in its results, as to be, in the writer's opinion, seldom or never justifiable, especially as a much simpler and more efficacious method can be adopted.

This consists, in the writer's opinion, in the transverse division of the iris and all underlying membranes—a modification, in fact, of the operation of iridotomy. This operation is at the present time but seldom performed, as the cases to which it is adapted are supposed to be of rare occurrence, and from the fact that even in these cases it rarely results in success. This want of success, however, is due, I think, not so much to the kind of operation as to the manner in

which it is performed. For the knife is entered commonly somewhere in the arch of the clear cornea, nearly perpendicular to the plane of the iris, and consequently at a small angle with the position of the opening to be made in its surface. From this it results that either the edge of the pupil is simply depressed before the knife, or, if a perforation is made, it is very small, and, from its position in the centre of a tense but inelastic membrane, is apt to close again almost immediately after the operation.

The substitute for this operation which I now propose consists, not in a simple opening in the centre of the iris, but in a large, free, and transverse section of the iris and all underlying membranes. The method of arriving at this result is as follows: any narrow knife, such as the ordinary cataract-knife of Graefe, may be used, though the narrow blade suggested by Liebreich is preferable. Better than either, however, I think, is the knife which I have had constructed for this purpose, and which is represented in the adjoining figure. This is simply an extremely narrow knife, with a very delicate cutting edge. The reason why the knife is made so narrow is that it may be turned on itself in the wound, at right angles, if necessary, with the position it occupied in making the puncture.

During the last year or two I have experimented with knives of various kinds and shapes, especially with those in which the blade is comparatively short, that is, from five to eight millimetres in length, with a delicate round shank; but I have a decided preference, in this method of operating, for the one described and figured here, which has a long and continuous cutting edge, for the others are apt to pierce the membranes without cutting them, when these are dense and tough, as is the rule in the cases under consideration.

The eye is fixed in the ordinary method, opposite to the site of puncture. The knife is then entered, not in the clear cornea, but at the sclero-corneal junction, or just within the scleral ring, and at the middle and outer circumference, if the cut is to be horizontal; at the lower border, if vertical—as it usually is.

Still, in desperate cases, the horizontal section of the iris has given, in the author's hands, the best results. The puncture is, indeed, made precisely as in the operation for cataract. If the anterior chamber is deep enough, and a narrow knife is used, this is entered with the edge downward, the blade of the knife being perpendicular to the plane of the iris. The knife is then carried completely across the anterior chamber, precisely as if a counter-puncture were to be made, until the point arrives at the peripheral portion of the major circle of the iris. The section is then performed by suddenly depressing the point of the knife with a bold, free movement of the hand, until the handle of the knife, from being horizontal, assumes a vertical position. Nor should the operator be content with this movement alone, but supplement it, while the point of the knife is still deep in the vitreous, with a gentle sawing movement while the knife is being withdrawn. In this way the fibres of the iris are thoroughly divided through its entire diameter, even up to the ligamentum pectinatum, and upon this fact, I think, the success of the operation depends; for we know that in that rare accident, rupture of the iris from violence, the resulting opening is not a linear split, but a wide extending aperture, which has precisely the appearance as if a large and complete iridectomy had been performed, although the eyeball itself has remained intact. Moreover, the autopsy shows in these cases of rupture that the cleft extends back as far as the ciliary processes themselves, and I am of opinion that something of the same kind takes place, through the elasticity of the tissue, when the incision is made to extend to the extreme peripheral portions of the iris. Of course, the cut must not be carried so far as to involve the ciliary processes and the ciliary muscle, though little injury, I am inclined to think from my own experience, would follow even if these were invaded to a small degree.

If a very narrow knife is not used, but the ordinary Graefe knife employed instead, or the anterior chamber is very shallow, then the knife is entered as in the ordinary operation for cataract, with the flat side parallel with the iris. It is then rotated when the point arrives at its proper destination, until the cutting edge is presented fairly to the membrane. The turning of the knife wrinkles up the cornea to a certain degree, but, notwithstanding this, the rotation should be thoroughly performed. For, if the attempt is made to depress the knife on the flat, or at an angle, the resistance offered by the thickened iris may suffice to tear this latter from its attachments, or, a small rent in its surface having been made, the rest of the iris

may be so folded back behind the knife as to give the impression that an opening of considerable extent has been effected, but which closes up again almost immediately by the depressed portion of the iris returning to its former position, and becoming fused a second time with the surrounding tissue.

As a first result of the operation, the surgeon usually finds the tissue give way before his knife, to be followed by a rent of a jet-black appearance. Should this not occur, he may feel pretty sure that the operation is not going to be successful, which is probably due to the fact that his incision has not been bold and free enough, or carried sufficiently toward the periphery at the finish.

In rare cases the new pupil may remain open and maintain its dark appearance from the beginning, and vision be at once and permanently improved. This can only occur, however, when the bleeding is slight. As a rule, the hemorrhage is sufficient to fill the pupillary space and so reduce the amount of vision that the operator may doubt whether any benefit has been obtained, especially as these clots are absorbed but very slowly. I have known the vision to remain unimproved for the space of two weeks, and then a gradual increase of sight to take place, followed by an admirable result. Sooner or later, a marked improvement almost invariably takes place, provided the sensation of splitting of the tissue under the knife is followed by the appearance of a black pupillary space. In those very pronounced cases where the membranes have such a density and such firm connections that there is fear of tearing the iris away from its attachments or seriously rupturing the hyaloid membrane, it is sometimes of advantage to use a second instrument to support the iris, and thus counteract the traction which the knife exerts in making the incision. A simple stop-needle can be used for this purpose, and this is then passed vertically through the peripheral portion of the cornea, transfixing the iris and subjacent tissues as it passes into the vitreous.

The needle is held vertically with one hand, while the cut is made with the other. It also serves, when skilfully managed, for the fixation of the eye. As these needles have, however, no angle, it is a little difficult to hold them in such a position that the iris does not descend along their polished surface with the pressure exerted by the knife when the cut is being made. It was to avoid this difficulty that the hook represented in the figure was designed. It is, in fact, a stop-needle with a curve to it. The hook is passed through the periphery of the cornea, and also through the iris and underlying

membranes. The handle is then gently raised until the iris rests in the bight or angle of the hook. The hook is, of course, inserted first, but it is better not to raise the handle until the knife has been carried across the chamber, and is in a position to make the section.

What has been said hitherto has applied to those desperate cases in which the inflammation has been so violent as to have invaded the whole iris, and the inflammatory products are so great that it is not so much a question as to what kind of an opening shall be made and of what shape, as it is to get an artificial pupil at all. But there are cases in which the inflammation seems to have spared the greater part of the iris, but to have blocked up the coloboma occasioned by the iridectomy, with a membrane too firm, both in its construction and in its connections, to be torn with needles or to be removed by traction. In these and similar cases, it would seem to be wiser to leave the membrane *in situ*, and to split the iris from the sphincter downward. The knife is then entered from below and carried upward beyond the pupillary margin, and the same depressing movement is made as has already been described, care being taken here likewise to divide the peripheral fibres of the iris by a gentle sawing movement as the knife is withdrawn.

The great advantage in this method of operating is the little violence done to the eye, since, in the first place, the external wound is so small that, as a rule, no vitreous whatever escapes, while the wound, from its very minuteness, closes at once, sometimes so quickly that the aqueous humor is reformed while the patient is still on the bed. Moreover, in the vast majority of cases the operation is so rapid and so painless that it can be performed without an anæsthetic, and can thus be repeated, when occasion requires, with but little discomfort to the patient, and little or no danger of inflammatory reaction. This method is very often of advantage, too, as a preliminary operation in those cases where an iridectomy would seem to be ultimately indicated, for by its means one portion of the iris can either be cut across or freed from its attachments to the surrounding tissue, so that, when the iridectomy is subsequently performed, the iris, having one free edge, can be seized by the forceps or a blunt hook, and drawn through the wound.

Here, as in every other case where the pupil has become occluded, it is better to wait a sufficient time for the inflammatory products to have become thoroughly digested before the operation is attempted, and the most brilliant results have followed when several months have been allowed to elapse between the extraction and the second-

ary operation. Still, in those cases where an inflammatory action of a low degree has followed immediately upon the original extraction, and the eye is prone to fall into a phthisical condition, it is often of great benefit as a curative means to perform the operation at once. Particularly is this the case in capsulitis, which I am inclined to think is not recognized, especially in its early stages and in its lighter degrees, so frequently as its importance demands. The trouble usually begins with an infiltrated and thickened appearance of the posterior capsule, which is often supposed to be due to remains of the cortical substance of the lens. The iris at this time is but little implicated, and is still dilatable to a considerable degree under atropine, and may continue so even when the proliferation of cells is so great as to produce a yellow appearance within the cavity of the capsule, or a hypopyon in the lower part of the anterior chamber. Little by little the iris becomes invaded by transplantation of the inflammatory process; the interchange of fluids between the anterior and posterior chambers is interfered with, the aqueous humor becomes turbid and the eye soft; the vision sinks very much, even to mere perception of light, and the whole eye seems to be gradually melting away under a low stage of inflammation.

If now an iridectomy is performed, the same dangers arise from the wound, and the same difficulties are experienced in getting out a piece of the iris, that have already been mentioned. But if, even in the later stages of the trouble, a simple but bold and free transverse division of the infiltrated capsule and the iris, or at least its sphincter, be made, the effect is always salutary and oftentimes magical.

I am therefore convinced, from my own experience, that this method of operation is one of the least dangerous and most efficient and speedy ways of making a permanent opening in just that class of cases which, as a usual thing, offer the greatest embarrassments to the surgeon.

A MODIFIED OPERATION FOR DISCISSION IN SOFT CATARACT.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

THE ordinary sickle-needle kystotome has proved in my hands an especially convenient, safe, and efficient instrument for executing a horizontal linear cut in the anterior lens-capsule. By its use the lens-substance may also be more or less extensively broken up, as the operator may desire, while the risk of rupturing the suspensory ligament, or of dislocating the lens, is reduced to a minimum.

The needles which I have used are of the manufacture of Lüer, of Paris, and of Otto & Reynders, of New York, the former having been made about thirty-five years ago, the latter about five years. Both are of a thin and delicate model, and in both the shank of the needle fills the hole made by the cutting portion. Both needles penetrate the cornea about as easily as the ordinary cataract-needles.

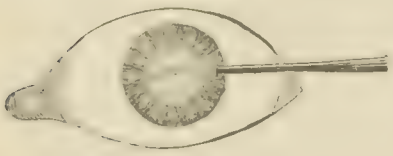


FIG. 1.

The puncture of the cornea is made near the outer (temporal) end of its horizontal meridian, holding the needle so that its flat side is parallel to the plane of the pupil, traversing the anterior chamber in the same position, and turning the point backward toward the lens only after it has reached nearly or quite to the opposite (nasal) side of the previously dilated pupil. (See Fig. 1.)

The division of the capsule, or of the capsule together with some of the layers of the lens, is effected by pressing lightly upon the lens-capsule with the point of the needle, and so withdrawing it. The linear cut in the capsule opens out into an oval, as indicated in Fig. 2.

FIG. 2.

By this method of operating, the length of the capsular opening, and also its position—whether across the centre of the pupil, or above or below the centre—can be very accurately regulated. The division may be confined to the lens-capsule and the most superficial layers of the lens, or it may be made to extend deeply into and

thoroughly to break up the lens-substance. The operation is therefore equally well adapted to simple capsular discission for solution, and to the freer division of the lens preliminary to linear extraction or suction.

NOTE.—The sickle-needle is mentioned and figured by Arlt—Graefe-Saemisch, III.—as a form of needle which may be used for the operation of discission, but the manner of using it is quite different from that which I have advocated.

REMARKS.

DR. KNAPP remarked that the needle referred to was very old. He had formerly used it in the operation of extraction, but had not found it as sharp as he would like. For capsulotomy in extraction he now used such a knife somewhat modified, making the cutting part straight.

DR. NOYES remarked that the needle referred to was familiar to all, the difference in quality depending, he thought, upon the thickness of the blade.

DR. GREEN remarked that both of his needles were of delicate construction and satisfactorily sharp at the point.

DR. WEBSTER said that the opening in the capsule, as indicated by Dr. Green, was much more extensive than that which he had been accustomed to make, and inquired if so free a division was not followed by a high degree of swelling of the lens.

DR. GREEN replied that he could make a small opening by this method as easily as a large one, and that a small opening was often to be preferred. If a large opening is required, this method offers the best means of making it, and with the least possible injury to the eye; but in making a free discission we must, of course, bear in mind the probability that we may have to get rid of the softened and swollen lens by linear extraction or by aspiration.

DR. BULLER inquired if he had found in certain instances any difficulty in dividing the capsule with the instrument which he recommended.

DR. GREEN replied that he could only speak of the two needles which he had used; with these he had had no difficulty. It was an instrument well known to the instrument-makers, and, he believed, generally well made by them. If he were to suggest any modification of it, it would be to sharpen the convex back of the needle for about a millimetre from the point, and thus possibly improve its penetrating power in passing through the cornea.

CASE OF NUCLEUS-LIKE BODIES IN THE LENSES OF A CHILD, ESCAPING AFTER DISCISSION.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

A GIRL, ten years old, and of average physical and mental development, came under treatment in October, 1879, with well-developed cortical cataract of nearly simultaneous appearance in both eyes. Until within a year she had been supposed to have ordinarily good vision.

Discission was performed upon the right eye, with the sickle-needle kystotome, in the manner described in the last paper. A central horizontal incision was made in the lens-capsule, across the field of the previously dilated pupil, through which a body, in appearance like a nucleus, and somewhat exceeding three millimetres in apparent diameter, escaped into the anterior chamber. The cortical portion of the lens was quite soft, and disappeared by solution in the course of two weeks, the nucleus having, meanwhile, become only slightly notched at its periphery. Nearly two months, dating from the operation, were required for its complete solution.

Two weeks after the operation on the right eye discission was performed upon the left eye in precisely the same manner, and was followed by the escape of a precisely similar nucleus. Six weeks after this second operation the patient went home with clear pupils and with only a very small remnant of undissolved nucleus in the left eye.

I have not before seen anything resembling a nucleus in the lens of a child, and I am inclined to the belief that the nuclear bodies observed in this case may have originated in lamellar cataracts, which may have been overlooked by the not very intelligent parents.

NOTE.—October 15, 1880. Four days ago, in operating by this method upon the right eye of a child three years old, with congenital cataract of both eyes, I encountered a precisely similar central body, which was not dislocated from its position. The rest of the lens, which was quite fluid, has already disappeared by solution, leaving the central solid body *in situ*, where it presents the general appearance of a lamellar cataract surrounded by a zone of clear lens.

OPTICO CILIARY NEUROTOMY.

DR. HENRY W. WILLIAMS, of Boston, gave a brief account of his experience with the new operation for enervation of the eyeball—optico ciliary neurotomy. He prefers operating from the inner side, with division of the internal rectus, which may afterward be re-attached to the globe by means of a point of suture. The use of Warlomont's scissors, which crush the retinal and ciliary vessels in dividing them, prevents or lessens the copious hemorrhage, which may cause marked temporary exophthalmos, and thus give rise to pain from distention of the lids and the intra-orbital contents. Should this happen, it soon disappears under the use of cold compresses, as does also the ecchymosis of the lids which generally follows the operation.

Sufficient time has not yet elapsed to allow us to determine the absolute value of neurotomy as a substitute for enucleation. In fact, Dr. Williams had twice done enucleation, perhaps unnecessarily, subsequently to having made the section of the optic and ciliary nerves, because of the persistence of symptoms which made him unwilling to take the responsibility of relying on a procedure of which the efficacy had not yet been fully established. But in most of his cases the results had thus far proved as satisfactory as those of enucleation. In two instances where bits of steel had remained in the eye—in one case fifteen, the other two years—the neurotomy gave immediate relief to urgent sympathetic symptoms, and the patients remain now, ten and six months after the operation, free from all morbid indications, notwithstanding the continued presence of the foreign bodies within the globes.

Dr. Williams considers a reunion of the severed ciliary nerves as exceedingly improbable, because of the tortuousness of their course through the loose tissues at the bottom of the orbit, and of the considerable projection forward of the eye which occurs in the first days after the operation. If, however, it should be proved that such a reunion does sometimes occur, and that it may give rise to a renewed manifestation of threatening symptoms, the comparatively slight operation of enervation might be repeated in any instance where there

seemed to be cause to suspect that reunion had formed, or that any important branch had escaped section.

REMARKS.

THE PRESIDENT remarked that the subject was one that interested him a great deal, and he hoped that Dr. Williams would give full histories of his cases in his completed paper. He would simply state a single case. During last winter a patient had submitted to two or three operations upon the eye. Sympathetic trouble having developed, the question was whether to enucleate the eye or perform the operation of ciliary neurotomy. He had found no difficulty in dividing the nerve. All that was required was to drag the eyeball downward and outward to an extreme degree, and then cut through the tissues. There was no difficulty encountered in operating upon this case. The subsequent result of the operation was convergent strabismus. Still later, however, the globe acquired its normal position. There was a question whether we might not give rise to sympathetic trouble from resting the artificial eye upon the stump.

DR. WADSWORTH said he had done the operation in eight cases. In all there had been relief of pain from the first, but in one pain recurred two months after the operation, with tenderness to pressure in the outer ciliary region; the eye was enucleated. The original affection in this case was rheumatic; the patient suffered from general rheumatism, and it was quite possible that the recurrence of pain was due to a rheumatic affection of the scleral or episcleral tissues, rather than to regeneration or escape from section of ciliary nerves. The recurrent pain was not constant—was confined to the eye itself; the cornea remained anæsthetic. In this case, as in all his cases, the internal rectus had been divided, and, after section of the opticus, the eye rolled so as to bring the posterior portion of the sclera to the front. His first case, and the first one in Boston, was operated on early in November, 1878. From both eyes cataracts had been removed a number of years before. One eye had been blind several years; lately it had become painful, and there was sympathetic irritation of the other. Neurotomy relieved the symptoms entirely. The cornea remained clear for several months, but since had become in part cloudy, grayish. In another case, operated on eighteen months before, the cornea was still anæsthetic, but perfectly clear, although the patient was a laborer, exposed to all weathers.

DR. NOYES stated that he had an old treatise which gave many anomalous distributions of the ciliary nerves, and he thought it exceedingly probable that there might have been some undivided twigs that kept up the sympathetic irritation.

DR. H. W. WILLIAMS considered that the indications for the new operation were much more extended than those for enucleation ever were. We still had the operation of enucleation in reserve. We saw many cases where we felt that the patient ought not to go from under our observation, but in which enucleation would not be

recommended at the time, or be consented to by the patient. In such instances enervation could be used as a preventive of sympathetic ophthalmia, and the patient would, in a large number of cases, consent to it. Admitting that we would occasionally lose an eye after this operation, he thought its employment would greatly reduce the number of cases in which sympathetic inflammation occurred.

DR. NOYES remarked that in his case there was no hemorrhage at the time of the operation, though in the majority of cases there was a rush of blood. The relief of pain which usually followed the operation seemed to him important evidence as to its value.

DR. NORRIS said that he had an exceptional case to report. The case was one of hemorrhagic glaucoma for which iridectomy had been done, with the result that the wound healed and the eye remained quiet for some time. There were further hemorrhages into the eye subsequently, and severe pain; however, the eye still looked well. Enervation of the eye was performed. Some difficulty was experienced in consequence of the excessive hemorrhage. The nerve was divided about one-eighth of an inch back of the eyeball, the ball was turned forward, and all the ciliary nerves divided. During this time there was a great deal of hemorrhage into the orbit, so that when he attempted to return the ball into its place he found he could only hold it in position by exerting considerable force; hence, he was obliged to complete the operation by enucleation. As before remarked, the patient had a tendency to hemorrhage in the retinal arteries.

CASE OF BUPHTHALMUS, WITH CENTRAL ANTERIOR SYNECHIA, CURED BY TOTAL REMOVAL OF THE IRIS.

By DR. HENRY D. NOYES,

NEW YORK.

THE subjoined case is, so far as I know, unique in the practice of eye surgery, and illustrates forcibly the theory of distention of the eyeball as the result of occlusion of the angle of the anterior chamber, and affords testimony to the curative value of an operation by which this occlusion is removed.

John Fitzpatrick, aged seven years, was admitted to the New York Eye and Ear Infirmary, November 19, 1879. The left eye was injured several years before, having been punctured by a pair of scissors. The anterior half of the globe is much enlarged, including the whole ciliary region and the cornea. The ciliary region is stretched to a bluish zone and the cornea projects in a globular form, having a diameter of not less than 18 mm., although it was not measured. It is thin and bluish black, and pervaded by a thin opacity, while a dense yellowish spot at the middle indicates the wound. The anterior chamber is apparently very deep and black, but in reality is abolished. The iris is pressed against the inner surface of the cornea over its whole surface and adherent to its middle, where the wound was made; its origin from the ciliary body can hardly be distinguished. The pupil is totally adherent to the cornea.

Tension + 1; eye not painful; lids could be closed over the globe; opposite eye good. Relief from deformity was what the parents desired, and the problem was how to reduce the eye to a normal size. Enucleation was to be the alternative if reduction could not be effected. I determined, in view of the peculiar relations of the iris, to try what would result from its total removal, provided this could be accomplished. An iridectomy I knew would be impracticable and inefficacious. Partial removal of the globe, by Critchett's method, I was unwilling to perform, because suppuration is not infrequent.

Chloroform given, an incision about 4 mm. long was made by the

point of a Graefe's knife thrust at a tangent into the vicinity of the origin of the iris. An effort was made to get across the anterior chamber with iris-forceps, but it failed. A small, sharp hook was then pressed between the iris and cornea flatwise and pushed across until the iris on the far side of the chamber, near its periphery, could be entangled in its point. It was rotated upon itself so as to secure a good bite of the iris, because the tissue, being atrophied, was very weak, and traction was steadily made to loosen the peripheral margin. It yielded easily and gradually tore away until about one-half was detached. The hook, with the iris-tissue in its grasp, was now outside of the wound, and the remaining iris was withdrawn with forceps, by means of which the attachment to the corneal scar was torn off. Very moderate bleeding occurred. A bandage was applied to both eyes.

On the fourteenth day the eye was healed, irritation almost disappeared, the staphyloma much reduced. Patient went home. In February, 1880, between two and three months after, the globe was found rather less than normal size, although not soft. The cornea had contracted and flattened, it had acquired a dense white opacity, with evident increase in thickness; the ciliary region was of normal appearance, the globe not tender.

There could be no question of the success of the operation in restoring the eye to its proper dimensions, and this was effected without any suppuration, but apparently by simply restoring the channels of excretion to their normal permeability. I am aware that Mr. Bader has done the same operation for glaucoma absolutum, and in 1872 he strongly recommended it. I repeated the proceeding in one case, but with disastrous results. No difficulty attended the operation, but during the night the lens was unable to sustain the *vis a tergo*, and was pushed out of the eye through the wound. Panophthalmitis and phthisis ensued. In the boy with buphthalmus it is probable the lens had disappeared; the tension was only +1, and such a mishap as I relate in my case of glaucoma absolutum could not occur. But I could not promise myself that unpleasant bleeding might not happen, and the curative effect of the proceeding was simply a speculation. Its success bears forcibly in sustaining the views of Knies, Weber, Schnabel, Brailey, and Priestly Smith, as to the importance to be attached to occlusion of the canal of Schlemm and the parts adjacent in giving rise to increased tension; and the gradual recession of the globe is direct evidence in favor of the theory that iridectomy in some measure effects its cure by opening up the obstructed channels of efflux of the intra-ocular fluids.

DERMOID CYST OF THE LEFT CORNEA.

BY DR. S. D. RISLEY,

PHILADELPHIA, PA.

A. R., aged eighteen years, male, consulted me January 20, 1880, regarding a tumor on his left eye. He related that his mother had noticed during very early infancy a white spot the size of a large pin's head near the external limbus of the cornea, but situated entirely on the sclerotica. It gradually increased in size as the child grew. It has never caused any pain or trouble other than the defective vision and deformity. At present, O. D. healthy, V. $\frac{1}{6}$ in O. S., deciphered Sn. 60 at 1 m. There is on O. S. a pinkish white tumor 5 mm. in height, 8 mm. in vertical diameter at the base, and 1 ctm. in its horizontal diameter. It was nearly an oblique truncated cone, and four black hairs, the length of ordinary ciliæ, with numerous colorless ones, grew from its top.

The base horizontal line is situated half on the cornea. The corneal side is steeper than the scleral side, and the base more sharply defined. The cornea is hazy, 1½ mm. around the base, and is lifted up above the surrounding cornea, which is elsewhere transparent. The iris reacts promptly; the anterior chamber is normal; the deeper media are transparent, and the fundus healthy.

The accompanying sketch, by Mr. H. T. Carris, of Philadelphia, in water-colors, very perfectly represents the appearance of the growth, which is undoubtedly a dermoid cyst. The lower sketch represents the appearance presented with the eye turned strongly toward the nose. The patient has not yet consented to its removal.

AN OPERATION FOR ENTROPION.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

By permission of the society, I offer for publication in its Transactions a description of the operation for entropion of the upper eyelid, which I have performed almost exclusively for the past five years, and which, in my hands, has afforded thoroughly satisfactory results, and far better than I have seen after any of the operations usually described in the text-books.

The operation is especially designed for cases of cicatricial entropion of the upper eyelid, following trachoma—cases in which, through the cicatricial contraction of the conjunctiva and underlying tissues, the tarsus becomes incurved, and the posterior lip of the free margin of the lid is drawn upward, so that the ducts of the Meibomian glands come to open backward against the eyeball, and the whole lid-margin appears narrowed, as it might appear if its posterior angle were shaved off.

In many cases of this affection the cilia along the whole lid-margin become inverted, constituting a typical entropion; in others the effect of the traction is less obvious, and the row of eyelashes may preserve a direction very nearly normal, but with here and there single lashes or small groups of lashes diverted from their place in the general ranks and turned backward so as to rub upon the globe—a condition known as trichiasis,[1] and constituting one of the commonest forms of that affection.

To both these classes of cases the operation under consideration is perfectly applicable, and that in the very worst cases I have met with, as well as in those of lesser deformity.

The operation consists essentially of three stages, although in particular cases the second and third stage may be modified, or even omitted.

[1] Occasionally a complete row of cilia becomes diverted in this way from the general ranks, and the case may then be called a distichiasis, if one cares to multiply names.

1. *Incision of the conjunctiva and tarsus.*—This incision is made in a line parallel to, and generally about two millimetres distant from the row of openings of the ducts of the Meibomian glands; it is carried through the entire thickness of the tarsus, and should extend, in cases of complete entropion, from near the inner to the outer canthus. The position and extent of the incision are indicated in Fig. 1.

The incision of the tarsus is most conveniently effected by the use

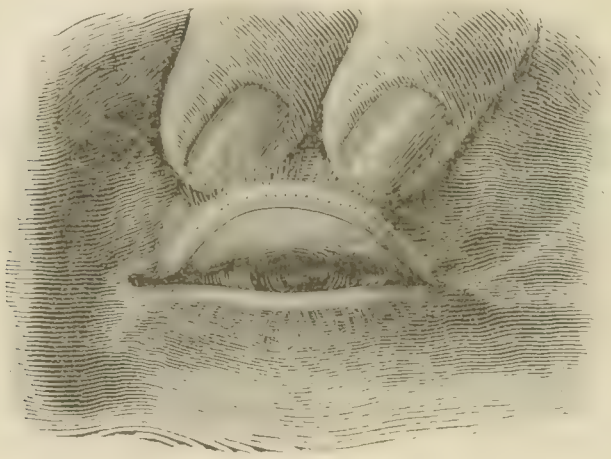


FIG. 1.

of the round-pointed scalpel shown, of two-thirds its actual size, in Fig. 2; it may be readily extended at either end, if necessary, by means of strong scissors. The lid is everted and held securely by the fingers, taking care to keep the eyelid and fingers dry to prevent slipping. There is no need of any instrument to hold the eyelid while making the incision; in fact, I have seen cases of positive injury to

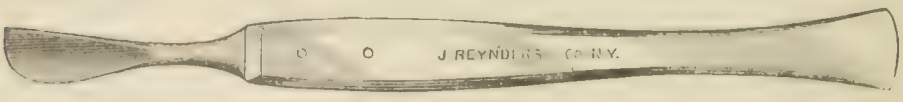


FIG. 2.

the tissues attributable to Snellen's clamp-forceps, even when they have been carefully used.

The effect of this incision is to separate the entire lid margin from the body of the tarsus, and thus to permit it to be easily everted and held without strain in its new position.

2. *Excision of a narrow strip of skin.*—The strip of skin to be

excised should not exceed one and a half or two millimetres in width, and should taper to a point at each end; its lower boundary should be about one millimetre and a half above the line of the eyelashes. Only the skin and adherent connective tissue should be removed, leaving the orbicularis fascia and muscle intact; the nutrition of the loosened lid-margin is thus perfectly maintained through the vessels of the muscular layer. Fig. 3 shows the position and dimensions of the strip of skin to be excised.

3. *The placing of the sutures.*—The curved suture needle is a No.

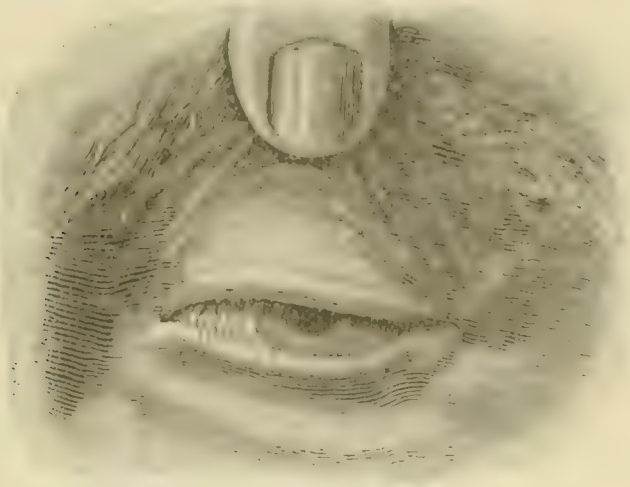


FIG. 3.

12 glover's needle bent to an arc of about a third of a circle; it is threaded with fine silk, and is held in any convenient needle-holder.

Fig. 4 shows the upper lid in vertical section, and illustrates the manner of placing the sutures.

The needle is first introduced a little to the conjunctival side of the row of eyelashes, and is brought out just within the wound made by the excision of the strip of skin (Fig. 4, A); it is then drawn through, inserted again in the wound near its upper margin, and passed deeply backward and upward so as to graze the front of the tarsus and emerge through the skin of the eyelid a centimetre or more above its point of entrance (Fig. 4, B). On tying the two ends of the thread together the skin-wound is closed, and the loosened lid-margin is at the same time everted and brought into a correct position. There is very little tension upon the stitches, and there is never

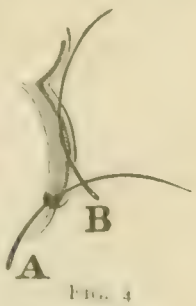


FIG. 4

any injurious strangulation of the included tissues. Three sutures generally suffice for the accurate adjustment of the lid-margin. In the spaces between and beyond the sutures it is often practicable and advantageous to turn the eyelashes upward against the front of the eyelid, and fix them there by means of collodion ; proceeding in this way it is often possible to remove one or more of the sutures as soon as the collodion has become dry, or even in some cases to dispense with them altogether.

The stitches should be removed, at latest, the day after the operation, reinforcing the line of suture by collodion as has just been indicated, or, in case the cilia are very short, using a few short fibres of cotton with the collodion.

The healing of the skin-wound is usually complete in the course of from two to five days ; the incision in the tarsus gapes widely upon the conjunctival aspect of the lid, and heals by granulation, requiring usually about three weeks for complete cicatrization. The conjunctival scar is smooth, and not more conspicuous than those often seen as the result of trachoma. In a few cases a fungoid growth appears in the conjunctival wound, such as is occasionally observed after operations for strabismus or for the enucleation of the globe ; it may be snipped off with scissors, and does not ordinarily tend to recur. In a few other cases a little fulness of the marginal tissues is developed, forming a slight protrusion near the middle of the lid, and requiring sometimes a slight secondary operation for its correction.

The results obtained by this method of operating are most satisfactory : the eyelashes are perfectly preserved, and grow luxuriantly in their corrected position, and there is generally no tendency to relapse, except in a few cases in which the operation has been performed during the active stage of trachoma. There is no appreciable shortening of the integument of the eyelid, and, after a few weeks, no visible cicatrix.

In typical cases of entropion the position of the row of eyelashes is perfect from the time of the operation. In cases complicated with trichiasis a most gratifying phenomenon is observed, viz. : the gradual rectification of the position of the deviated single cilia, or groups of cilia, which fall into line with their fellows so that all traces of irregularity ultimately disappear.

Another important feature in the cure is the very perfect renewal of the posterior lip of the lid-margin in cases in which it has been

apparently completely effaced by the disease. This renewal is very remarkable, and results also in the restoration of the openings of the Meibomian glands to their normal position upon the free margin of the lid.

A very great advantage which this operation offers over most others lies in the fact that it may be repeated, if necessary, upon the same eyelid. It is therefore perfectly applicable to cases in which the trachomatous process is still active, and I often perform it in such cases with the effect of materially hastening the cure of the trachoma. It is especially applicable also to cases in which large pieces of skin have been cut away from the lid in the vain hope of thus curing the inversion of the cilia; also in cases of an unsatisfactory result following Arlt's operation. In these latter cases I do not ordinarily excise any skin, but sometimes dissect upward a little between the tarsus and the orbicularis muscle, after having incised the tarsus in the manner described. The rectification of the position of the loosened lid-margin is then effected, if necessary, by the use of collodion.

The incision of the conjunctiva, and probably also of the tarsus, parallel to the lid-margin, is mentioned by Celsus under the name *subsectio palpebræ*. In slight cases of incurvation this incision is often very effective in restoring the lid-margin to its normal width, and the Meibomian gland openings and cilia to their normal position and direction; its effect may be considerably increased by the use of collodion to plaster the eyelashes up against the skin of the eyelid, thus effectively utilizing the row of cilia as levers to turn the lid-margin forward, and to maintain it in that position as long as may be desired. A similar incision was employed by Crampton and his followers, but always as an adjunct to the two vertical cuts through the whole thickness of the eyelid which constitute the characteristic feature of Crampton's operation.

Other surgeons—von Ammon, Jaesche—have practised a longitudinal section through all the layers of the eyelid—conjunctiva, tarsus, muscle, and integument—thus isolating a bridge of marginal tissue, which remains attached only at its two ends, and which is, therefore, liable to be destroyed by sloughing or injured by ulceration. To avoid this danger the section, *tarsotomia horizontalis* of von Ammon, has generally been made at a considerable distance (6 mm.) from the lid-margin, and therefore not in the best place for correcting its position and the direction of the eyelashes. G. Jaesche

alone appears to have made the section nearer to the lid-margin; but, as Arlt reports him, he made it of limited length, and performed it only in cases of partial entropion. Conjoined with this section, the excision of a very broad strip of skin (6 mm. to 1 ctm. and even more in height) has always been directed; and it has been thought to be important to suspend the loosened lid from the forehead by means of sutures, as was done also by Crampton.

The operation described in this paper has been the outgrowth of successive variations from old and well-known methods. Beginning with Arlt's operation, the first variation consisted in preserving the muscular layer of the lid intact, for the purpose of maintaining, through its vessels, the integrity of the marginal bridge bearing the cilia.[1] Next followed the trial of Jaesche's method, as described by E. Jaesche (*Klinische Monatsblätter für Augenheilkunde*, 1873), but excising a much narrower strip of skin, and applying the sutures so as strongly to evert the whole lid-margin, but without making use of the suspending threads employed by Jaesche. Lastly, it was found to be much better to confine the principal incision to the conjunctiva and tarsus, and thus to avoid severing the vascular connection of the loosened lid-margin.

I communicated a short description of this operation, substantially as I have now given it, to the Fifth International Ophthalmological Congress, New York, 1876, and called it, somewhat inaccurately, a modification of von Ammon's *tarsotomia horizontalis*. Experience with the operation during the four years which have elapsed since that publication has but confirmed my earlier impressions in its favor as the best general method known to me for the correction of entropion of the upper lid, whether simple or complicated with trichiasis. Two variations from the general method as I have described it have appeared to me to be useful in particular cases, viz.: the omission to excise the strip of skin in cases in which the integument of the lid is already deficient, and the substitution of collodion for the sutures, in part or altogether, in cases in which the eyelashes are long and well preserved.

Canthoplasty is frequently indicated in conjunction with this operation, and should generally be performed at the same time. In the

[1] This change in the plan of his operation was made by Arlt also, and was first published by him, so far as I know, in 1874, some two years after I had independently adopted it.

greater number of cases, however, it is superfluous, and may even be harmful.

NOTE.—Since the first publication of this operation it has been several times referred to by writers who have incorrectly stated that it is substantially or exactly the procedure of Burow, Sr. (*Berliner klinische Wochenschrift*, June 23, 1873). Burow's operation consists: first, in the incision of the tarsus in the position described and figured in the text, but with the difference that the incision is made to include the whole thickness of the lid, with the exception of the cutis; second, in the excision of a fold of integument, which, however, is expressly stated to be a *broad* fold, in order that the traction of the stretched skin may hold the tarsal incision open upon its conjunctival aspect during the whole period of healing by granulation; and third, in the closure of the skin-wound by *superficial* sutures, which are said to have been allowed to remain in some cases as long as five or six weeks without causing suppuration.

The procedure of Burow, in all its essential features, is fully described in Himly (Berlin, 1843, pp. 136, 11, and 129, 5, *d*) as one of the methods advocated by Celsus, Ætius, and Paul of Ægina. The especial value of my own method depends, as I believe, upon points of detail in which it differs from the older operations, viz.: the preservation of the vascular connection of the loosened lid-margin through the muscular layer, the narrowness of the excised strip of skin, the manner of applying the sutures, and the use of collodion to glue the eyelashes against the front of the eyelid, thereby taking advantage of the leverage of the cilia as an additional and efficient means of maintaining the lid-margin in its corrected position.

PHOTOGRAPH OF THE FOVEA CENTRALIS OF THE RETINA.

By Dr. O. F. WADSWORTH,

BOSTON, MASS.

(With Photograph.)

At the meeting of the society in 1873, I showed two sections running horizontally through the fovea centralis of the retina, under the microscope. For the photograph of one of those sections, now presented, I am indebted to the kindness and skill of Prof. J. W. S. Arnold, of New York. Other attempts have been made to photograph the sections, but none has proved so successful, on the whole, as this.

Though this picture is not an exception to the rule that photography offers a very imperfect means of representing the microscopic details of animal tissues, it may yet be regarded as of interest for two reasons: because illustrations of but very few sections through the fovea, schematic or other, are to be found; and because, in a photograph directly from the section, there can be no question of personal equation on the part of the draughtsman.

The section is from the eye of a girl of four years, removed in May, 1871, on account of a total staphyloma of the cornea so large as to be troublesome. The eye was placed in Müller's fluid immediately on removal, and some weeks later transferred to alcohol. It had been expected that the retina would be found atrophied to some extent. It proved, however, microscopically normal in every respect. As is evident from the section, there was no plica centralis, and this was probably due, in part at least, to the fact that the vitreous was so albuminous as to be solidified by the preserving fluids used.

The divided line beneath the section represents, as estimated by careful measurements, a length of 1 mm. in the actual section.

TRANSACTIONS

OF THE

AMERICAN

OPHTHALMOLOGICAL SOCIETY

Seventeenth Annual Meeting.

NEWPORT, 1881.

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Whole number 84

MINUTES OF THE PROCEEDINGS.

SEVENTEENTH ANNUAL MEETING.

Held in the City of Newport, July 27 and 28, 1881, at the Masonic Building, corner of Church and School Streets.

NEWPORT, *July* 27, 1881.

THE Society was called to order at 10 A.M., by the President, DR. HENRY D. NOYES, of New York.

The first business was the appointment of committees, and the Chair appointed the following:

COMMITTEE ON MEMBERSHIP.

DRS. HASKET DERBY, of Boston; W. H. CARMALT, of New Haven; JOHN GREEN, of St. Louis; GEORGE C. HARLAN, of Philadelphia; and ARTHUR MATHEWSON, of Brooklyn.

COMMITTEE ON BULLETIN.

DRS. GEORGE STRAWBRIDGE, of Philadelphia, and H. G. MILLER, of Providence.

AUDITING COMMITTEE.

DR. O. F. WADSWORTH, of Boston.

The Treasurer, DR. RICHARD H. DERBY, of New York, read his report, which was referred to the Auditing Committee and approved.

The report of the Committee on Membership was read by DR. HASKET DERBY, Chairman. The following candidates were recommended for membership: Dr. H. W. Bradford, of Boston; Dr. S. C. Ayres, of Cincinnati; Dr. W. F. Mittendorf, of New York; Dr. J. P. Worrell, of Terre Haute.

Upon ballot, these gentlemen were elected members of the Society. The name of Dr. A. Alt, of St. Louis, proposed by Drs. J. Green and C. J. Kipp, was presented for membership.

The report of the Committee on Bulletin was received, and the following was the order in which papers were read:

1. The first paper was by Dr. William F. Norris, of Philadelphia, "On the Administration of Anæsthetics in Bright's Disease of the Kidneys, and on Some Cases of Sudden Death after Cataract Operations."

It was discussed by Dr. A. Mathewson, after which a paper entitled

2. "One Hundred Cases of Cataract Extraction, with a Single Failure; with a Discussion of the Advantages of Non-Anæsthesia in this Operation," was read by Dr. Hasket Derby, of Boston.

The papers read by Drs. Norris and Derby were then discussed by Drs. D. B. St. John Roosa, George Strawbridge, H. W. Williams, W. H. Carmalt, the President, O. F. Wadsworth, J. S. Prout, B. Joy Jeffries, C. J. Kipp, and the authors.

3. "The Peculiar Look of the Color-Blind." By Dr. B. Joy Jeffries.

4. "A Case of Persistent Hyaloid Artery." By Dr. W. S. Little.

5. "A Contribution to the Study of Glaucoma (Cases)." By Dr. W. S. Little.

The last paper was discussed by the President, who mentioned two cases where he had removed the entire iris.

Dr. John Green then read a paper entitled

6. "Iridotomy, with Division of an Anterior Synechia, by the Use of Wecker's Pince-Ciseaux."

7. "Case of Congenital Paralysis of the Sixth and Seventh Nerves." By Dr. George C. Harlan.

8. "Cicatrices of the Face, Involving the Eyelids and Orbit, and the Means to be Adopted for Remedying the Defects which they Produce."

9. "Malignant Disease of the Bones of the Orbit and Face." Both by Dr. C. S. Bull (by title).

10. "A Source of Danger in the Eye Glass Frame as Commonly Manufactured." By Dr. Francis B. Loring.

11. "Report of a Case in which Useful Vision was Maintained through a Number of Years by the Aid of a Totally Dislocated Lens." By Dr. Samuel Theobald.

The paper was discussed by Drs. G. C. Harlan, H. W. Williams, and the President.

12. Dr. Hasket Derby then exhibited Dr. H. W. Bradford's "Electro-Magnet," and cases were reported in which this or a similar instrument had been used by Drs. C. J. Kipp, B. Joy Jeffries, and the President.

13. "The Comparative Value of the Mydriatics in Ophthalmic Practice." By Dr. S. D. Risley, of Philadelphia.

The paper was discussed by Drs. John Green, F. B. Loring, S. Theobald, William F. Norris, W. S. Little, D. B. St. John Roosa, E. W. Bartlett, S. C. Ayres, O. F. Wadsworth, and the President.

The Society then adjourned to meet at 7.30 P.M.

First Day—Evening Session.

The Society was called to order at eight o'clock, by the Vice-President, Dr. William F. Norris, of Philadelphia.

14. The first paper was read by Dr. Charles J. Kipp, of Newark, N. J., and entitled "Two Cases of Sarcoma of the Choroid Presenting Unusual Clinical Features."

It was discussed by Drs. John Green, J. F. Noyes, O. F. Wadsworth, and the President.

Dr. S. Theobald, of Baltimore, then read a paper on

15. "What Constitutes Insufficiency of the Internal Recti Muscles?"

It was discussed by Drs. O. F. Wadsworth, R. H. Derby, D. B. St. John Roosa, John Green, S. D. Risley, G. Hay, G. C. Harlan, F. Buller, the President, and the author.

16. "Weak Eyes in the Schools of Philadelphia." By S. D. Risley, M.D., of Philadelphia.

The paper was discussed by Drs. O. F. Wadsworth, W. S. Little, and the author.

Dr. Charles H. Williams, of Boston, reported, with remarks,

17. "Two Cases in which he had Removed Steel Chips from the Eye by Means of the Electro-Magnet."

The Society then adjourned to meet Thursday at 9.30 o'clock.

SECOND DAY—JULY 28, 1881—MORNING SESSION.

The Society was called to order at 9.30 A.M., by the President.

The Secretary read the minutes of the previous sessions, and they were approved.

Dr. Carmalt moved that all papers read in session be referred to the Publishing Committee, with power to print or reject them. This motion was seconded and carried.

Dr. Kipp requested the privilege of obtaining an abstract of the proceedings for publication in the *Archives of Ophthalmology*. Granted.

A similar request made by the stenographer, Dr. W. M. Carpenter, was granted for the *Medical Record*.

18. The first paper was read by Dr. F. Buller, of Montreal, and entitled "A Case of Sudden and Complete Loss of Vision after Large Doses of Quinine."

It was discussed by Drs. John Green, D. B. St. John Roosa, and S. D. Risley.

19. Dr. John Green then read a paper "On Marked Narrowing of Field, with Diminished Acuity of Vision following the Use of Duboisia, and Presumably Due to the Use of that Drug." By Dr. J. P. Worrell, of Terre Haute, Ind.

20. Dr. George C. Harlan, of Philadelphia, then reported "A Case of Intermittent Concomitant Convergent Strabismus."

It was discussed by Dr. S. Theobald and the author.

21. Dr. D. B. St. John Roosa, of New York, reported "A Case of Concussion of the Vitreous, Choroid, and Retina by a Bullet."

It was discussed by Drs. O. F. Wadsworth, G. Hay, and the President.

22. "Neurotomy of the Optic and Ciliary Nerves." By Dr. O. F. Wadsworth, of Boston.

The paper was discussed by Drs. C. J. Kipp, F. Buller, S. D. Risley, and the President.

23. "Observations on Some Therapeutical Applications of Pilocarpine" was the title of a paper read by Dr. John Green, of St. Louis.

It was discussed by Drs. S. Theobald and S. D. Risley.

Verbal Communications.

Dr. S. Theobald, of Baltimore, exhibited a set of lachrymal probes. Also a bandage constructed so as to prevent the puckering of the binocular eye-piece.

Dr. H. D. Noyes, of New York, reported a case of so-called "Cure of Cataract by Electricity." He also reported a case of "Pulsating Exophthalmos," cured by the ligation of the blood-vessels.

Dr. John Green spoke of the use of Snellen's clamp as a forceps in the operation for entropion.

Dr. H. D. Noyes described a modified operation for preventing wrinkling of the pedicle of the flap brought down from the forehead, in plastic operations for removing the deformity due to extensive removal of tissue in cases of epithelioma of the inner angle of the orbit.

Dr. W. H. Carmalt reported "A Case of Traumatic Arterio-venous Aneurism."

Dr. S. D. Risley spoke of the difficulty in making a diagnosis of tumors of the orbit, and related a case.

Dr. George C. Harlan reported a case similar to that reported by Dr. Carmalt; also a case of "Congenital Aneurismal Varix."

The following papers were read by title:

1. "On the Clinical Resemblances between Sound and Color."

2. "Bony Growth of the Conjunctiva."

3. "A Remarkable Case of Splenic Disease, with Retinitis Leucæmica." All by Dr. E. G. Loring.

4. "A Case of Pulsating Tumor of the Orbit." By Dr. H. S. Schell.

5. "Ulceration of the Cornea, Relieved by the Removal of Cerumen from the Ears." By Dr. James A. Spalding.

The Committee on Membership nominated the following officers for the ensuing year:

President—HENRY D. NOYES, of New York.

Vice-President—WM. F. NORRIS, of Philadelphia.

Secretary and Treasurer—RICHARD H. DERBY, of New York.

Corresponding Secretary—J. S. PROUT, of Brooklyn.

Committee on Publications—E. G. LORING, D. B. ST. JOHN ROOSA, of New York.

These gentlemen were all duly elected.

The Committee recommended for the next place of meeting, Lake George—or Newport, if proper accommodations at Lake George cannot be obtained.

Dr. F. B. Loring was added to the Committee, to arrange for the place for holding the annual meeting in 1882.

Upon motion the Society then adjourned.

RICHARD H. DERBY, *Secretary.*

Present at the seventeenth annual meeting:

DR. S. C. AYRES.
DR. EDWIN W. BARTLETT.
DR. F. BULLER.
DR. W. H. CARMALT.
DR. HASKET DERBY.
DR. RICHARD H. DERBY.
DR. LEWIS S. DIXON.
DR. JOHN GREEN.
DR. GEORGE C. HARLAN.
DR. GUSTAVUS HAY.
DR. B. JOY JEFFRIES.
DR. CHARLES J. KIPP.
DR. W. S. LITTLE.
DR. F. B. LORING.
DR. ARTHUR MATHEWSON.
DR. H. G. MILLER.
DR. WILLIAM F. NORRIS.
DR. HENRY D. NOYES.
DR. J. F. NOYES.
DR. J. S. PROUT.
DR. SAMUEL D. RISLEY.
DR. D. B. ST. JOHN ROOSA.
DR. GEORGE STRAWBRIDGE.
DR. S. THEOBALD.
DR. J. J. B. VERMYNE.
DR. O. F. WADSWORTH.
DR. CHARLES H. WILLIAMS.
DR. HENRY W. WILLIAMS.

ON THE ADMINISTRATION OF ANÆSTHETICS IN BRIGHT'S DISEASE OF THE KIDNEYS, AND ON SOME CASES OF SUDDEN DEATH AFTER CATARACT OPERATIONS.

By WILLIAM F. NORRIS, M.D.,

PHILADELPHIA, PA.

I PROPOSE to call the attention of the society for a few moments to the record of two cases of death supervening unexpectedly after operations for cataract, which occurred within a few weeks of each other in my practice, during the spring of the current year. They present four features in common; 1st, they were both anæsthetized with sulphuric ether; 2d, they entirely recovered consciousness; 3d, they died comatose—one a few hours, the other eighteen days after the operation; 4th, in both cases a careful autopsy revealed no organic lesion, except Bright's disease of the kidneys. In my opinion both deaths were due to the same cause, namely, the congestion caused in already diseased kidneys by the administration of ether.

CASE I.—A child, five months old, with congenital cataract, whose parents maintained that it had always been healthy since birth, and that it had had no convulsions or other symptoms of serious disease. The child was etherized by the family physician with a small quantity of Squibb's ether on a towel, while it lay in its mother's arms, and was, when insensible, placed on a table, where a very moderate discission of the anterior capsule and of the anterior fibres of the lens was made without accident, in the usual way. This was between 3 and 4 P.M. The child readily recovered consciousness, and was sufficiently itself to nurse its mother's breast. Nevertheless, it remained fretful, and at 6 P.M. it had a convulsion, which was followed by others, and it died comatose at 8 P.M. An autopsy was held the next day at 12 M., and a very careful examination made of the brain, heart, lungs, and abdominal viscera; but, beyond congestion of the brain and its membranes, and a similar state of the lungs, there was

no demonstrable lesion in the body, except fatty degeneration of the kidneys. These organs were not granular, but presented yellow splotches of parenchymatous fatty degeneration. After hardening some portions in alcohol, others in Müller's fluid, sections were made, which under the microscope showed intense congestion of the kidneys, the veins and capillaries being gorged with blood, both in the cortical substance and in the straight tubes. Indeed, these vessels were so distended, that in specimens double-stained with indigo-carmine and carmine (a process which stains the red blood-corpuscles apple-green), they looked under a low power as if an artificial green injection had been forced into them. The parenchyma showed areas of cloudy swelling and fatty degeneration of the epithelium, most pronounced in the cortical substance. The mother of the child appeared healthy, the father emaciated and cachectic. There is no history of hereditary disease of the kidneys in either side of the house. They have had in all six children, three healthy (then, after a visit of the father to Europe), two miscarriages, and lastly, the child whose history and death are here recorded.[1]

CASE II.—A lady, sixty-eight years old, dark, rather yellowish complexion, hazel eyes, black eyebrows and hair, the latter beginning to be gray. Apparently in good health, thin, but active. Marked arcus senilis in each eye; ripe senile cataract, with good light-perception in right eye; and, except very moderate gouty enlargement of the knuckles of each hand, no marks of disease. She claimed to have always been free from any severe disease, but at times to suffer from what she called "wind colic," which she thought due to indigestion and congestion of the liver. Her family physician, who had known the household intimately, both as a friend and a doctor, for many years, was not aware of any organic disease.

The operation of extraction was performed on the right eye, the

[1] It would be foreign to the purpose of these brief clinical notes to enter into the discussion of the question of the frequency of Bright's disease of the kidneys in infants, or of its hereditary occurrence; but it may be worthy of mention that Steiner and Neumüller (Prager Vierteljahrschrift für praktische Heilkunde, 1870, p. 88) give reports of autopsies in 265 cases of Bright's disease in children; and Adolph Kjellbing, in the Journal der Kinderkrankheiten, 1870 (as quoted on p. 442, Biennial Retrospect, New Sydenham Soc., 1869–70), after citing the dicta of Billard, Valleix, Bouchut, Vogel, and Gerhardt, as to its extreme rarity, says that the numerous autopsies made at the Children's Hospital of Stockholm show that parenchymatous disease of the kidneys is frequent in children, most frequent in measles and intestinal catarrh, and that in pneumonia, out of 200 cases, 33 had Bright's disease.

patient being fully under the influence of ether. A small upward corneal flap was made by a Graefe's knife, leaving a considerable conjunctival flap, from which and from the iridectomy there was considerable hemorrhage. The cornea collapsed as soon as the aqueous was evacuated. The anterior capsule was tough and had white spots of degeneration on it, and the lens was, therefore, removed with a wire loop, but with the loss of only a few drops of vitreous. The patient recovered readily from the anæsthetic, but I noticed, with considerable anxiety, that during that evening and on the day following she was thirsty and feverish, pulse 100, tongue coated with a heavy yellow fur, and the urine, which was diminished in quantity, was passed very frequently, and was heavily laden with urates. I was inclined to think I had before me the commencement of a panophthalmitis, but there was no pain or swelling of the eye, and the wound healed kindly. On the fourth day she got up, and daily afterward, for nine days, sat up several hours each day. At the end of two weeks the bandages were removed, and the patient, much pleased to find that she could see the pictures on the wall of her room, and that with $+\frac{1}{2}$ sp. she could tell the time on a watch; but, although the eye improved steadily, yet slowly, the general symptoms still continued unfavorable. The patient did not gather strength; the pulse remained about 100, the tongue heavily coated, and she complained occasionally of "wind colic," with discomfort and pain, mainly along the course of the colon. She was allowed milk-toast, beef essence, scraped beef, etc., with ice-water in moderate quantities; neutral mixture and sweets spirits of nitre were exhibited to allay her fever, while her colic and tendency to constipation were combated by the administration of blue mass and compound extract of colocynth. Sixteen days after the operation I was summoned with the statement that she was delirious, and found her mind wandering, although by a sharp question she could be gotten to give a sensible reply. On the evening of the same day she was worse, and on the following days entirely wandering in her mind. On the seventeenth day after the operation, at eight o'clock A.M., her pulse was 108, temperature 100°, respiration 30, with bronchial mucous râles in the chest. The urine was examined, not because any kidney disease was demonstrable from the symptoms, but rather to obtain a more complete understanding of the case, and it was found to have a specific gravity of 1008, a small amount of albumen (after settling in the test-tube, one-ninth the bulk of the urine), and the microscope showed triple phosphates and urates, with fatty and granular casts.

Brandy and digitalis were administered in moderate doses, but the patient became comatose, and died on the eighteenth day after the operation, the operated eye being entirely healed and quiet.

An autopsy showed a healthy brain; lungs crepitant throughout; heart with normal valves, but slight hypertrophy of the walls of the left ventricle; liver, spleen and other abdominal viscera healthy, except the kidneys, which were decidedly granular.

The microscope showed great congestion, marked increase of the interstitial connective tissue, fatty degeneration of the epithelial cells, and numerous casts in situ in the straight tubes.

It is, I believe, a universally admitted fact that chronic Bright's disease in its advanced forms is a grave complication of any operation, and Paget, in his "Clinical Lectures and Essays," pp. 39, 40, 1875, speaks most emphatically on the subject, saying: "I do not know by how many times the risks of a given operation are increased in any patient who has albuminuria, but I do know that you will find it a safe rule never to perform any operation without an acquaintance with the manner in which the patient's kidneys perform their functions; and *never to perform one, except under something like compulsion, on a patient whose urine is constantly albuminous.*"

That this is not too strongly stated, my own early experience affords confirmatory evidence in the death of a patient twelve days after cataract extraction, where no anæsthetic was administered, and where a post-mortem examination showed marked Bright's disease of the kidney. J. L., seventy-nine years of age, with unusually marked rigidity of the radial arteries. *No anæsthetic.* Peripheric linear extraction. Operation in all respects normal, and patient immediately after counted fingers readily. The wound healed quickly, leaving a clear pupil; there was no inflammation of the eye, but mild senile delirium occurred, which, however, disappeared, and on the third day he got up with the nurse's help and walked about the ward. On the fifth day the tongue became dry, the cheeks flushed of a dusky red, and the wandering delirium returned. His stomach also became deranged, and he had nausea and indigestion. During the entire period he suffered from home-sickness, and worried about money. The sick stomach ceased, but the pulse became feebler, hardly to be felt in the rigid and calcareous arteries. He died on the twelfth day after the operation.

Autopsy.—Fatty kidneys, with numerous cysts; coronary arteries atheromatous, one nearly occluded by calcareous matter; radials,

vertebrals and carotids also calcified; a large fibrinous clot attached to the mitral valves; brain healthy.

While chronic albuminuria manifestly increases the risk of operations without anæsthetics, we find comparatively little said as to any increased risk from the employment of anæsthetics in these cases. Turnbull, however, distinctly recognizes increased risk from their administration; and in speaking of their use, in "Transactions of the American Medical Association," 1880, p. 292, says: "It is now a well-recognized condition, that in disease of the kidneys anæsthesia almost invariably produces coma and death."

These remarks, however, as well as most other references which I have been able to find on the subject, refer to the immediate danger of death on the operating-table. If, however, this is not the only danger—if the administration of ether can, in certain cases, so stimulate some latent forms of chronic Bright's disease as to cause decided interference with the functions of the kidneys, and death from uræmia, at an interval varying from some hours to two or three weeks after the operation, we have certainly additional and grave cause well to weigh the propriety of administering anæsthetics in all operations for chronic disease in persons with albuminuria, and certainly ought never to perform one without examining the urine of all cases to detect any latent disease of the kidneys, so that both the operator and patient shall be fully forewarned of the additional risk to life under such circumstances.

I believe that the two cases above detailed were both cases of uræmic poisoning, caused by the irritant action of the anæsthetic on a kidney with marked, although latent disease. In neither case was there any evidence of septic poisoning. In the first there was no time for its production; in the second no focus of unhealthy inflammation in the eye to start it, and no evidence of it at post-mortem; moreover, septic poisoning is usually accompanied by chills and high temperature (102°—104°), which were never present in this case.

I am aware that Snow,[1] writing on anæsthetics, says that death occurring so long after the administration of an anæsthetic should not be attributed to it; while Bigelow[2] thinks that in such cases death may or may not be accelerated by them. I am also aware that

[1] On Chloroform and other Anæsthetics, by Jno. Snow, M.D. 8vo, pp. 442. London, 1858.

[2] Anæsthetic Agents, by H. W. Bigelow, pp. 107–221 in the Trans. Amer. Med. Asso. for 1848.

anæsthetics are frequently administered in puerperal convulsions, and that ether is occasionally given to cases known to have Bright's disease of the kidney, without apparent evil results, and could cite two cases in the practice of my friends in this city, in one of which a patient known to have Bright's disease was twice successfully anæsthetized with ether for surgical purposes (scraping dead bone); and in another, under similar circumstances as regards the kidneys, ether was three times successfully administered for minor surgical operations; and I have no doubt that other surgeons could furnish many parallel cases; but, because fatal results do not follow in all cases, we have no right to shut our eyes to those where their employment apparently leads to fatal disturbance of the renal functions. We know that ethers are diuretics and largely excreted by the kidneys, and it is possible that in some cases it causes fatal congestion of these already diseased organs.

Emmett and Hunt, so far as I can find, are the only authors who distinctly recognize and state this remote danger of ether as distinguished from the immediate risk at the time of administration. The former, at p. 750 of the second edition of the "Principles and Practice of Gynæcology," details a case where ether was administered for the operation on a lacerated perineum, and the patient died in thirty-two hours with well-marked symptoms of *uræmic poisoning*. In his comments on this case, he remarks: "The case was reported, and in the report I called the attention of the profession to the greater necessity of examining the condition of the kidneys than that of the heart. Since then I had at least five deaths to occur from *uræmic poisoning* in public and in private practice, and these perhaps might not have occurred if my assistants had been able to examine or had appreciated the importance of examining the urine before the anæsthetic was given."

On the following page the same author states that, at the Women's Hospital, examination of the urine has become an established rule, and that, therefore, many cases of unsuspected kidney disease are discovered, which are treated by the administration of opium previous to the operation, instead of an anæsthetic during its performance.

Hunt (*Philadelphia Medical Times*, January 9, 1875) speaks in less decided terms, but gives a case where ether had to be desisted from at the time of operation, owing to the alarming depressant influence on the pulse; and when death occurred, about two weeks after the injury, with symptoms not pyæmic, but which at the time

were attributed to surgical fever, the kidneys were in a marked state of fatty degeneration. The writer asks: "May not conditions of this kind often explain the unpleasant and even fatal action of an anæsthetic?"

ONE HUNDRED CASES OF CATARACT EXTRACTION, WITH A SINGLE FAILURE; WITH A DISCUSSION OF THE ADVANTAGES OF NON-ANESTHESIA IN THIS OPERATION.

By HASKET DERBY, M.D.,

BOSTON, MASS.

FOUR years ago I prepared, for the meeting of this society, a paper entitled "A Few Practical Suggestions concerning Extraction of Cataract" by the method of Graefe. Owing to the railway disturbances, a quorum of members failed to appear at Niagara, and no meeting was held. The paper was subsequently published in a local journal.[1]

A brief *résumé* of the points then insisted on forms a necessary introduction to the present statistics. They were:

First.—The use of myotics rather than of mydriatics, as preparatory to extraction—the principal advantage suggested being the lessened liability to subsequent prolapse of the iris into the corners of the wound.

Second.—The avoidance of anæsthetics. The diminished sensitiveness of the senile eye was alluded to. Anæsthesia induces congestion, which tends to further hæmorrhage. It must be preceded by fasting, which goes to diminish the patient's courage and lessen his strength. Insensibility being once produced, all motion of the eyeball must be induced by dragging with fixation-forceps. The globe loses its tension. The patient can give no information as to the clearness of his acquired vision. And vomiting, if violent or prolonged, is an evident source of danger. Finally, the moral support of a single act of sight, indulged in before the bandage is finally applied, gives confidence and supplies hope, both important factors in aiding a patient to support the days of darkness that are before him.

Third.—It was advised that the lids be allowed to remain closed

[1] Boston Medical and Surgical Journal, November 1, 1877.

for at least seven days after the operation, and that, under ordinary circumstances, no examination of the eye be made during that time. This was based on the well known fact that the first appearance of certain inflammatory complications was apt to follow the first exposure of the eye to air and light; and that, even in cases which did well, the whiteness and freedom from irritation about the site of the wound were always succeeded, after opening the eye, by a certain amount of temporary redness and irritation.

I now append the statistics of one hundred extractions in which these hints were acted on, and contrast them with a similar number of cases in which anæsthesia was employed, mydriatics used, and the eye examined within a shorter period after the operation than above advised—the whole occurring in my own practice. These cases were not selected, but were simply instances of hard, uncomplicated senile cataract. For the sake of convenience, they are grouped under two heads, viz., with and without anæsthesia. It is to be understood however, that those coming under the second head were operated on with the pupil under the influence of eserine, and that the eye, in each instance, was not examined for a week or more after the operation.

TABLE.

	100 Cases with Ether.	100 Cases without Ether.
Percentage of cases occurring in private practice	30	42
Average age	61.7	65.8
Loss of vitreous	14	9
Duration of treatment	18.3 days.	16.5 days.
Secondary operations	22	14

RESULTS.

Vision = 1	1	1
Vision = 0.9	..	3
Vision = 0.8	..	..
Vision = 0.7	6	4
Vision = 0.6	..	3
Vision = 0.5	1	8
Vision = 0.4	13	18
Vision = 0.3	20	12

	100 Cases with Iridectomy.	100 Cases without Iridectomy.
Vision = 0.2	22	31
Vision = 0.1	18	9
Success V. 0.1 and more	81	89
Partial success, V. $\frac{1}{12}$ to $\frac{1}{60}$, but including ability to get about unattended	8	9
Reasonable prospect of success on performance of secondary operation	2	1
Failure	9	1
	100	100

It will thus be seen that, of the first 100, 91 recovered, or are likely to recover, an appreciable amount of useful vision. Of the second 100, 99 were thus fortunate. The percentage of loss in the first series is confessed to be unduly large; and that that of the latter will be steadily maintained, by following out the method, it is not of course claimed. But that this method has had, in my hands, a decidedly greater measure of success than the other, there is no room for doubting; and it can safely be said that this increased success did not depend on additional experience in operating, or increased manual dexterity, due to practice.

The single case of failure in the second hundred was discharged from the hospital on the fifteenth day. Moderate inflammation had followed the operation, but, at the time of discharge, though the pupil was blocked with cortical remains, the anterior chamber had long been re-established, redness had disappeared, and there was good perception and projection. Not long after the patient had returned home, severe pain came on, followed by suppurative choroiditis, which ultimately necessitated enucleation.

The nine cases of failure in the first series were due, in six instances, to corneal suppuration; in two to cyclitis depending on the presence of cortical remains; and in one to panophthalmitis.

As has been already stated, none of these were selected cases, but taken in the order of their occurrence, in private and in hospital practice—uncomplicated senile cataracts, with good perception and projection. Of the second series a single case, however, has been skipped, and the hundred made up by adding what would properly be the hundred-and-first. A man, aged seventy-five years, very restless during the operation, the performance of which was thus ren-

dered unusually difficult, was discharged on the fifteenth day, with excellent perception of light, but with a pupil blocked with rapidly absorbing corticalis. He was ordered atropine, and told to report at regular intervals. This he promised to do, but, instead, returned at once to his distant home, probably abandoned all treatment and all care, as regards the use of the other eye, and is reported by letter to have undergone a painful inflammation, and lost the eye. I never saw him again, but think I am justified in rejecting the case from my list, as ordinary prudence and obedience to directions would, in all probability, have resulted in the restoration of useful vision.

In the annual reports of the Massachusetts Charitable Eye and Ear Infirmary for 1878 and 1880, it is undertaken to compare the results of operations for extraction performed with and without anæsthetics during these years. The percentage of success inclines, each year, very slightly in favor of the operations done without ether. I desire, however, to protest against the value of any inference from these statistics. The cases occurred in the practice of at least six surgeons—experienced operators, it is true, but using each his own method, and all previously accustomed to the regular employment of anæsthesia. Now, the object of this paper is not to claim that the *mere avoidance* of anæsthesia is likely to materially further the success of extraction, without an intelligent utilization of the advantages a state of consciousness places at our command. These advantages, as already stated, consist, in part at any rate, in the power of the patient to direct his eye by an effort of the will, and in his ability to inform the surgeon, at the close of the operation, as to the clearness of his vision. A surgeon who maintains the use of the fixation-forceps through the operation, dragging the eye-ball hither and thither by an instrument the application of which is exquisitely painful—and a surgeon who obtains what seems to him a clear pupil at the close of the operation, but closes the eye without testing vision, and going again to work, if the test be unsatisfactory, until clearer sight is obtained, fails to appreciate the advantages of non-anæsthesia, and is not entitled to point a moral by the results he secures. As my colleagues at the Infirmary have not, as yet, in all instances acted on this understanding, I cannot admit that their figures, good as they are, may not ultimately be improved.

The operations here reported were all performed according to the method of von Graefe, the single departure therefrom being in the cut itself, which was more corneal and less linear than that originally recommended by him. My present practice is to apply a one per

cent. solution of eserine, or, still better, a mixture of eserine and vaseline, of the same relative strength, an hour before operating. The morning hour is ordinarily selected, the patient being allowed to have a good breakfast, and occupying the bed in which he is to remain. I employ no assistant in the cases where ether is not given, an experienced nurse being found capable of giving all necessary help. Fixation-forceps are employed to hold the eyeball only until the counter-puncture is completed, and are not again used during the operation. It might be thought by some that the unrestricted motion of the eye would embarrass the performance of the iridectomy, but this I have not found to be the case. Introducing the forceps with the left hand, and using the scissors with the right, the patient being told to look down and cautioned against any sudden movement of the eye, the task of the operator has been found easy. I have only once had a slight dialysis. The moment the iridectomy is completed the speculum is removed, and now entirely dispensed with; the patient is allowed to rest a few moments, any hemorrhage being controlled by the external application of sponges dipped in ice-water; the upper lid is then raised and gently held against the edge of the orbit with the fingers of the left hand, while with the right the surgeon first divides the capsule, and then presses out the lens by means of the caoutchouc spoon applied on the outside of the lower lid, the patient the while looking down. Vision having been tested and found satisfactory, the corners of the iris are replaced with the rubber spatula, and a light compressive bandage applied. This bandage is changed the same evening, afterward once a day. The patient sits up in bed that afternoon, gets up in forty-eight hours, and has the bandage removed and the eye first opened on the eighth day. Any unusual complications are, of course, met by earlier examination.

No antiseptic precautions were taken in any of these cases.

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA.

No.	Sex.	Age.	Remarks	Length of Time in Bed in Days.	Secondary Operation.	Result.
1.	F.	87	.....	10	.....	0.2
2.	M.	64	.....	18	.....	0.4
3.	F.	61	Some capsule left in pupil.	14	Operation proposed.	0.15
4.	M.	61	Slight iritis	14	.....	0.1
5.	F.	56	Cataract immature; some cortical remained behind.	17	.....	0.4

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA —(Continued.)

No.	Sex.	Age.	Remarks.	Length of Treatment in Days.	Secondary Operation.	Result.
6.	M.	61	Iritis; pupil filled with membrane	25	Capsule operation.	0.2
7.	F.	76		14		0.7
8.	F.	49		14		0.3
9.	F.	61	Cataract immature	15		0.3
10.	F.	55		18		0.7
11.	M.	61		16		1.0
12.	M.	55		16		0.2
13.	F.	68	Hypermature; vitreous lost; iritis followed	27	Capsule operation.	0.2
14.	F.	60	Some loss of vitreous; tedious convalescence	35		0.1
15.	F.	49		15		0.35
16.	M.	69		10		0.4
17.	M.	72	Patient rheumatic; iritis and closed pupil followed	46	Secondary operation.	0.3
18.	F.	68	Iris tremulous; some loss of fluid vitreous; low iritis.	27		0.05
19.	M.	69		10		0.25
20.	M.	41		9		0.33
21.	M.	60		9		0.15
22.	M.	62	Struck eye a severe blow during convalescence	14		0.25
23.	M.	71	Mild iritis	17	Capsule operation.	0.5
24.	F.	55	Six days later, hemorrhage into anterior chamber	21		0.5
25.	M.	73	Feeble; rheumatic; iritis and closure of pupil	47	Capsule operation.	0.2
26.	M.	78		15		0.25
27.	F.	72	Immature. Iritis	18	Secondary operation.	0.05
28.	M.	55	At discharge pupil filled with capsule; told to return	24		0.2
29.	F.	57	Capsule in pupil; to return.	13		0.1
30.	M.	77		13		1.0
31.	M.	72	Pupil, at discharge, filled with capsule; to return.	13		0.033
32.	F.	72	Slight loss of vitreous; scoop used; acute mania on sixth day	6		0.2
33.	F.	60		13		0.5
34.	M.	72	Senile delirium during convalescence	15		0.2
35.	F.	60	Blow on eye five days after operation; iritis and closed pupil; to return	16		Counts fingers at 1 metre.
36.	M.	60		15		0.5
37.	M.	60	Capsule in pupil; to return.	11		0.06
38.	F.	80		12		0.2
39.	F.	63	Slight iritis	17		0.7
40.	F.	76		15		0.1

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA
(Continued.)

No.	Sex.	Age.	Remarks.	Length of Time in Days.	Secondary Operation.	Result.
41.	F.	75	.....	18	.....	0.2
42.	M.	77	Slight iritis.....	20	.....	0.2
43.	F.	65	Slight loss of vitreous.....	14	.....	0.4
44.	F.	63	Iritis.....	26	.....	0.2
45.	M.	70	Corticalis fluid; nucleus removed by scoop.....	14	.....	<1.0
46.	F.	65	.....	12	.....	0.3
47.	M.	70	Capsule left in pupil.....	14	Capsule operation...	0.5
48.	M.	62	.....	16	Capsule operation...	0.4
49.	M.	78	.....	14	.....	0.3
50.	M.	72	.....	14	.....	0.2
51.	M.	70	Capsule left in pupil.....	14	Secondary operation.	0.33
52.	F.	58	Capsule left in pupil.....	17	Secondary operation.	0.33
53.	F.	68	Scoop used; slight loss of vitreous; iritis.....	31	.....	0.2
54.	M.	72	Capsule left in pupil.....	14	Capsule operation.	0.15
55.	F.	73	.....	16	.....	0.33
56.	F.	47	Subsequent examination discovered floating opacities in vitreous.....	14	.....	0.25
57.	F.	50	Some cortical could not be removed.....	16	Secondary operation.	0.2
58.	F.	60	Slight iritis.....	19	.....	0.16
59.	F.	62	.....	14	.....	0.7
60.	M.	73	.....	14	.....	0.5
61.	F.	63	Patient had albuminuria....	14	.....	0.11
62.	F.	47	.....	13	.....	0.3
63.	F.	60	Capsule in pupil at time of discharge; patient did not return.....	13	.....	0.17
64.	F.	63	Patient had Bright's disease, of which she died within a year.....	21	.....	0.14
65.	M.	55	.....	14	.....	0.33
66.	M.	64	Iritis and closure of pupil..	18	Secondary operation.	1.0
67.	F.	67	Iritis.....	19	.....	0.5
68.	F.	77	Slight loss of vitreous in attempting to remove capsule.....	14	Secondary operation.	0.6
69.	M.	75	Very rheumatic; iritis followed, with closure of pupil.....	15	Secondary operation.	0.3
70.	F.	81	Much bleeding; lens very sticky; tedious convalescence.....	30	.....	nearly 0.1
71.	F.	78	Much hemorrhage, not wholly ascribed at discharge.....	19	.....	0.16
72.	F.	73	Capsule left behind; patient did not return for secondary operation.....		.....	0.07

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA —(Continued.)

No.	Sex.	Age.	Remarks.	Length of Treatment in Days.	Secondary Operation.	Result.
73..	F.	65	.....	16	.....	0.25
74..	M.	77	Retinal separation discovered just before discharge.	16	.....	0.025
75..	F.	65	.....	18	Capsule operation...	0 5
76..	M.	73	.....	14	.....	0.3
77..	F.	66	Acute mania after operation, ungovernable; bandage removed; hemorrhage supervened.....	14 17	.....	0.07
78..	M.	62	.....	12	.....	0.4
79..	F.	68	Suppurative choroiditis on twentieth day; eye subsequently enucleated.....	15	.....	0.
80..	F.	63	.....	18	.....	0.3
81..	M.	68	.....	13	.....	0.25
82..	F.	63	.....	15	.....	0.4
83..	F.	52	.....	14	.....	0.33
84..	F.	72	.....	15	....	0.3
85..	F.	76	.....	14	.....	0.25
86..	M.	51	.....	14	.....	0.3
87..	F.	69	Cataract immature; iritis; closure of pupil.....	18	Secondary operation.	0.5
88..	F.	39	Slight loss of vitreous.....	18	.....	0.5
89..	F.	70	.....	15	....	0.33
90..	F.	75	....	14	.....	0.2
91..	F.	71	Much capsule left in pupil; patient did not return, as requested.....	15	.....	0.05
92..	M.	72	Scoop used.....	13	.....	0.16
93..	F.	52	.....	13	.....	0.4
94.	M.	66	.....	11	.....	0.3
95..	M.	64	.....	12	.....	0.6
96..	M.	74	....	11	.....	0.14
97..	M.	65	.....	12	.....	0.23
98..	M.	58	Slight loss of vitreous; scoop used.....	22	....	0.16
99..	F.	70	Iritis.....	28	Secondary operation.	0.45
100..	M.	82	.....	16	.....	0.1

DISCUSSION ON THE PAPERS READ BY DRS. NORRIS AND DERBY (1 and 2).

DR. A. MATHEWSON, of Brooklyn, referred, as negative evidence upon the subject of Dr. Norris's paper, to the case of an old man who was the subject of chronic Bright's disease, and upon whom he had operated for cataract. The patient bore the anæsthetic and the operation perfectly well. The operation was that of extraction. He also added two cases in which death followed the administration of

ether and the operation of iridectomy. The operation was done quickly and while the patient was in the primary stage of anæsthesia. The autopsy revealed cerebral hemorrhage as the cause of death. In the other case kidney disease was suspected, although he had not demonstrated its existence by examination of the urine. No autopsy could be obtained.

Dr. D. B. St. John Roosa, of New York, hoped that gentlemen with a much wider experience than his own would join in the discussion, but he wished to contribute to it briefly. He wished to say in advance that he appreciated fully every word spoken by Dr. Derby, and the injunction he had given concerning opening the eye after extraction of cataract. Whatever might be the experience of other gentlemen, he believed that much was gained for the success of cataract operation by leaving the eye closed, as he was taught to do in the earliest period of his pupilage, as he was taught again not to do, but as was his present practice. During the last year he had had his share of experience in cataract operations in New York and in Vermont, and was convinced that to early opening of the eye might be ascribed some of the unfavorable results which occurred. Ingress of air and light was sometimes permitted at an early stage, and, so far as his experience went, he believed that it was the starting-point of inflammation in many cases.

He wished very much that he could agree so thoroughly with Dr. Derby concerning the use of anæsthetics, but it seemed to him that Boston patients must be much better trained, if not much better disciplined, than those which he saw. He had attempted on some occasions to train the patient so that he or she would be able to submit to the operation without the use of an anæsthetic; but, as strongly as he felt in favor of the point in Dr. Derby's paper, already alluded to, just so strongly he felt upon the other side with regard to the use of anæsthetics. He felt, in a large majority of cases, much safer while performing the operation with than without an anæsthetic. Even the sad experience of Dr. Norris concerning the injurious effects of ether upon patients suffering from kidney disease would not deter him from using an anæsthetic. It would cause him to be more careful in determining the condition of the kidneys prior to the operation; but even then, knowing as he did, from what he had been told by general practitioners who were experienced, how few people have sound kidneys, he believed that he would take the risk of anæsthesia, thinking that its benefit compensated for the possible dangers. The question could not be settled by elaborate statistics from one authority, but must be tested by the average outcome of professional experience, and it came down to the fact that a man has no real authority except his own experience, which he has compared as conscientiously and zealously as possible with that of men who were as wise or wiser than himself.

Dr. George Strawbridge, of Philadelphia, had been interested in both of these papers. With regard to Dr. Norris' paper he had particular reason to be interested. He thought there was one point

with regard to the giving or not giving of ether which was specially important. If we knew that the kidneys were decidedly diseased, and we were called upon to decide whether or not an anæsthetic should be administered, it would be found difficult in many cases, because of the great danger the patient would be placed in from shock, if the operation was performed without an anæsthetic. Undoubtedly the shock of the operation had been a prominent cause of death after this operation in many cases, and the question to be decided was: "Is the risk with ether greater than that from the shock of the operation itself?"

With regard to Dr. Derby's paper, he had not used ether in cataract extraction but twice, and he had not had any trouble in performing the operation without anæsthesia.

DR. H. W. WILLIAMS, of Boston, thought that the advantages attending the use of ether were considerable. He agreed with Dr. Derby that the eye should be let alone for several days after the extraction was performed, and regarded it as the best procedure except in cases where symptoms developed which warranted the conclusion that something was going wrong. He believed that ether gave advantages which counterbalanced certain possible dangers attending the vomiting liable to follow the administration, such as expulsion of the vitreous, possibly internal hemorrhage. He had not, however, seen those accidents occur. If the ether is rather crowded upon the patient, the chances of vomiting were reduced; but, even with the chances that vomiting will occur, the fixation-forceps, when the eye is insensible, involve no force, and the globe is held in position with ease. On the other hand, if the eye-ball was turned down without anæsthetics, the patient did feel the fixation forceps considerably, and the recti muscles resisted, which he thought increased the danger of expulsion of the vitreous. He always removed the fixation-forceps after the incision was completed, and when the patient was under the influence of ether there was no tendency to turn the eye-ball up, as there was always when the eye was in its normal condition. He had yet to see the disadvantages, and he believed there were positive advantages, from the use of anæsthetics.

DR. W. H. CARMALT, of New Haven, had seen two cases in which death occurred after cataract extraction without ether. In one case death occurred within four hours, and in the other several days afterward. In the latter case there had been diabetes, and for about four years previously the patient—a woman—had been treated for that disease, and apparently had recovered. She had a cataract, and Dr. Carmalt assisted at the operation for its extraction. The tissues of the eye, however, were in such an abnormal condition that the pigment washed off from the iris, so that at the time the incision was made the aqueous fluid was stained almost to the color of India-ink, and there was no attempt at repair on the wound. The patient declined rapidly, and died within four days from the date of the operation.

In the other case the patient was a woman, fifty five years of age, who had double cataract of the ordinary hard variety, and apparently in good health. She came to his office one day, and wished to be operated upon at once. She denied ever having any illness at all. She wished to take ether, and Dr. Carmalt told her that he would give it to her, but upon examination he found a murmur with each sound of the heart, which was also hypertrophied, and he regarded the cardiac condition such as contraindicated the administration of ether, and, therefore, performed the operation without the aid of an anæsthetic. He questioned the patient with reference to cardiac disease, and she denied positively any knowledge of its existence, and said that she had been able to go upstairs and do ordinary work without affecting her breathing at all. The operation was performed satisfactorily, operating upon the left eye only, and making the lower incision. It was performed at 4 o'clock in the afternoon, and at 8 o'clock of the same evening the patient was dead. The history which he obtained was that she had laid upon the couch not experiencing any trouble, except that she had coughed a little, which upon further investigation seemed to be nothing more than a mere clearing of the throat. She seemed to be feeling well, and talked with her husband concerning the operation, and as he went to his supper he covered her hands with the bedclothes. Returning within half an hour, he found his wife in the same position as when he left her, and supposed that she was asleep, and did not disturb her until about ten minutes afterward, when he attempted to attract her attention, but failed, and he then listened and found that she was not breathing, and was dead. There was no autopsy. Perhaps the ether would have avoided the shock from which she apparently died.

Dr. Norris remarked that the action of ether in many cases of fatty heart was beneficial rather than otherwise. He recalled a case in which he performed an operation for cataract some three years ago. The patient was a lady who was thought to have fatty heart, and it became a question whether or not ether should be given for the operation. Her pulse was feeble before the anæsthetic was begun, but it steadily gained in strength under ether, until it became full and reasonably strong, and no bad symptoms whatever followed this administration, and the patient fully recovered without accident. He had been told by Dr. Hunter, who had administered ether in a large number of cases in Philadelphia, that the heart's action was strengthened by it. As to the risk of death after any operation, it was recognized that kidney disease was a serious complication. Sir James Paget had regarded it as improper to perform any surgical operation upon a patient who had constant albuminuria, and in Turnbull's book on anæsthetics the author had stated that it was a well-recognized fact that anæsthetics should not be given in cases in which kidney disease existed.

The President said that although he had used anæsthetics, both ether and chloroform, freely in a number of cases, he had not yet had

a fatal result. He had used ether where he knew that the patient had kidney disease, and also complications on the side of the heart. He had not been in the habit of examining the urine as a preliminary to operations. He recalled one case with serious complications. It was that of a feeble woman with diseased kidneys and enlarged heart, and much prostrated, who required enucleation. Although the action of the heart became tumultuous and rapid under the influence of ether, the patient did well. It had not fallen to his lot to see a fatal result from the use of anæsthetics. In three instances where chloroform was used he had seen respiration and pulse absolutely suspended, and it required a length of time, which he was unable to estimate, for it seemed so long, to bring back the functions of the lungs.

Now, following operations in old people, there were certain things which occurred not infrequently. Two weeks previously he had performed a cataract extraction upon an old man without anæsthetics, and on the following night—not having had his eyes open except to introduce atropine—he rose from his bed, tore off his bandage, and for twelve days remained in a condition of mild delirium, which Dr. Noyes regarded as due to cerebral anæmia and not to atropine-poisoning.

During last autumn he performed cataract extraction on an old man who was excessively anxious about the operation, and disposed to melancholia. The operation was performed without ether and without an unpleasant result, but the patient had scarcely recovered when his old symptoms returned, and he had since been distressed by continued melancholia. Such liabilities were to be taken into account in forming an opinion as to the influence of any agent upon old people.

He regarded Dr. Norris's first case as decidedly unique. He was not, however, prepared to follow the suggestions made by the author of the paper.

The President then spoke concerning what might be done to avoid the necessity of giving anæsthetics for cataract or other operations in which it might seem desirable to use them.

Priestley Smith, in a book on glaucoma, has suggested that it was well to precede an operation by the free administration of the bromide of potassium, and when the suggestion first came to the President's notice it had already been his custom to give forty grains of the bromide before an operation, sometimes combined with half that quantity of chloral; but since that time he had not only given full doses of the bromide and chloral just preceding the operation, but for two or three days before, so that the patient came to the operation fully under the sedative influence of the drug or drugs. By resorting to that, the occasion, in a percentage of cases, for giving anæsthetics, had been considerably abated.

Again, in those cases in which it had seemed necessary to use anæsthetics for cataract extraction, it had been his practice for several years to give ether—sometimes chloroform—in a way which

furnished the least unpleasant effects. He had very frequently, in selected cases, given only sufficient ether or chloroform to prevent their primary quieting effect, not reducing the patient to a state of muscular relaxation while the incision was being made, and then would allow the patient to recover entirely, so as to obtain the benefit of his consciousness and co-operation for the further steps of the operation. He had found this procedure practicable in a considerable number of cases. Upon the general question, the use of anæsthetics in cataract operation, he had grown to favor the opinion expressed by Dr. Derby. His practice was selective, yet he resorted to them less frequently than formerly. There are certain advantages which are inherent in the absence of chloroform and ether, especially those mentioned by Dr. Derby—the tonicity of the eye to aid in the act of expulsion, etc.; and besides, a point not alluded to by the author of the paper, a patient who was fully under the influence of an anæsthetic was much more likely to have unpleasant hemorrhage in the aqueous chamber, and it was much more difficult to get rid of, because of the absence of *vis a tergo*.

Dr. O. F. Wadsworth, of Boston, had not had any experience in cataract operation without ether. He had performed iridectomy several times without ether, and in one case had had an unpleasant experience. It was that of a man who insisted upon not taking ether, and he appeared to be quite able to bear the operation. The moment, however, the iris was drawn out through the wound, he suddenly rolled the eye strongly upward, twitching away from the forceps, and filling the anterior chamber with blood. A portion was brought away in the forceps, and the entire iris might have been torn out; but, as it was, the result was a tolerably fair one. From his experience in iridectomy without ether, where the patient was obliged to restrain himself for only a short time, it had seemed to him that the performance of cataract extraction without ether would be threatened with bad results in certain cases.

Dr. Wadsworth asked Dr. Derby in how large a proportion of his cases did he find it necessary to give ether; that is to say, in making up the one hundred cases in which the operation was performed without ether, how many did he find in which it was necessary to resort to anæsthetics?

Dr. Derby answered that it was impossible to say. The ether was almost always given at the special request of the patient; but such cases were more and more rare every year. Dr. Derby further remarked upon a point made by Dr. Wadsworth with reference to iridectomy. He did not think that cases of iridectomy were parallel with cataract extraction, because iridectomy was a notoriously painful operation, and it had seemed to him that an eye with a senile cataract was less sensitive than normal, and that an iridectomy could be performed with less pain than in other cases.

The President suggested that the non-sensitiveness might be incident to old age, and not due to the cataract.

Dr. Derby said that possibly such was the case.

DR. J. S. PROUT, of Brooklyn, referred to one case in which, after the corneal section was made, he was obliged to stop and give ether before the extraction could be completed. He also referred to Horner, of Zurich, who had said that he would not operate for cataract with anæsthesia : that if he could not perform the operation without an anæsthetic, he would not perform it.

DR. B. JOY JEFFRIES, of Boston, saw no objection to the use of ether, yet he did not hesitate to operate without it. He had attempted to operate without ether, and had been obliged to stop and administer it, and had not seen any bad results from so doing.

A PECULIAR EXPRESSION OF THE EYES OF THE COLOR-BLIND.

BY B. JOY JEFFRIES, M.D.,

BOSTON, MASS.

PROF. WILSON, of Edinburgh, says in his monograph, published in 1855, p. 152 : "I have lastly to notice that there is a singular expression in the eye of certain of the color-blind, which may assist in their detection. It is difficult to describe it, and it is wanting in well-marked cases. But various of the color-blind, whose cases I have described, have presented a peculiarity of look which others have recognized on their attention being drawn to it. In some it amounted to a startled expression, as if they were alarmed ; in others to an eager, aimless glance, as if seeking to perceive something, but unable to find it ; and in certain others to an almost vacant stare, as if their eyes were fixed upon objects beyond the limit of vision. The expression referred to, which is not at all times equally pronounced, never altogether leaves the eye which it seems to characterize.

"Whether its occurrence in those color-blind persons whom I have examined is but an evidence (which it may be), or the unconscious betrayal of a defective sense, I do not attempt to decide ; but I mention the matter here that future observers may keep it in view." Prof. Wilson further says, p. 173 : "Since the passage in the close of the Supplement, referring to a peculiar expression in the eyes of certain of the color-blind was written, I have had the opportunity of observing it somewhat particularly in four gentlemen, not relatives, in two of whom it was readily recognized by others. All the parties referred to have healthy eyes, and excellent vision for

everything but color. One has an absent, anxious glance, with something of the expression which amaurosis gives, only the pupil is small. One has a startled, restless look. The other two have an eager, prying, aimless air. The character common to them all, and to the others I have seen, is this aimlessness of look. Macbeth's reference to Banquo's ghost—

> 'Thou hast no speculation in those eyes
> Which thou dost glare with'—

very happily expresses the peculiarity which I find it so difficult to define. It has not, however, in most cases anything repulsive about it. The majority of those I have seen presenting it would be described as having fine eyes. In one the wistful, somewhat melancholy, but pleasing expression of his eye had attracted my attention long before I knew that he was color-blind.

"I do not know whether Dalton or the other famous examples of color-blindness had any such look as I have referred to. This note may lead others to make further inquiry in the matter."

On page 67 of my manual on "Color-blindness: Its Dangers and its Detection," I said: "I can recall something of what Dr. Wilson describes in reference to two or three of my color-blind acquaintances, but, on the contrary, not at all in reference to others. I recognize his difficulty in describing just what it is. I doubt if I should have noticed it, or at least connected it with color-blindness, except for his remarks in reference to it. Had he spoken of such a look or peculiar expression on the part of the color-blind when being examined, I could corroborate it from my experience with both adults and young persons. I have now and then made my diagnosis correctly, from a peculiar, dazed, half-anxious expression of the face and eyes of a looker-on awaiting his turn, as if he was called upon to do something unusual, and sought or expected further explanation than that given the normal-eyed. I do not, of course, mean the natural nervousness of those conscious of some defect; but of those color-blind who had no idea anything was wrong with their chromatic sense, and who often proved difficult to convince. I believe no other observer than Prof. Wilson has remarked on or recorded anything of the kind."

Since writing the above I have seen very many more color-blind, and hence had further opportunity of familiarizing myself with this peculiar look which belongs to them alone, and is not due to any ametropic condition, occurring as it does in the emmetropic. I

awaited some mention of it in the several monographs which have touched on peculiarities connected with color-blindness, but not finding any I called attention to it in a communication before the Boston Society of Natural History at the November 17, 1880, meeting. I would by this brief article draw the especial attention of gentlemen who, officially or otherwise, test for chromatic defect, to this peculiar look, as it cannot but exist among the now many hundred color-blind who have been examined by competent observers, with some of whom the latter must come in frequent contact.

From my later experience I can, however, add but little to Prof. Wilson's description. There is a certain liquid look to the eyes, as if slightly suffused. It gives also the color-blind person the appearance of not listening, or not being interested in what you are saying to them. I have, as I said, detected a color-blind person by this look; but I have also equally failed—being, I suppose, too anxious—to find it before I was sufficiently familiar with it. It has been readily recognized by intelligent bystanders to whom I pointed it out.

A lady once asked me what was the matter with Mr. Blank's eyes. Knowing he was color-blind, I drew her on to describe what she meant, and her account was a very good repetition of Prof. Wilson's, above quoted. She had never heard of this peculiar look of the color-blind. She has since noticed and spoken to me of the same look in reference to some other mutual acquaintances who are color-blind.

I can now recall this peculiar look as connected with the facial expression of a gentleman I knew for many years without detecting his chromatic defect, although the question of color had been entered into between us. His nephews I found color-blind, and they told me of the ridiculous mistakes of their *maternal* uncle. One of these nephews told me only yesterday that he could detect no difference between the brilliant skyrocket lights changing from red to green.

This peculiar expression of the color-blind varies in amount, and even at different times, in the same person. It, however, seems to always hover about the eyes. I cannot answer positively whether it is more apparent in those most defective. I judge that it is.

In speaking before the Natural History Society, last year, I said that I had not noticed it in the few color-blind females whom I had detected. Since then I have found a very color-blind lady in whom it exists to some degree. I probably should not have noticed it, except for my considerable experience with other color-blind.

An anecdote may here help to explain the effect of this peculiar look. During my labors of testing the Boston public scholars I was

one day at a boys' school, when the several classes coming and going in the hall made such a disturbance that the principal stepped on to the edge of the platform to stop it. He said nothing, but merely looked at the lads. To my surprise the noise ceased as soon as he had attracted attention. I thought to myself, as I watched his face, well, that indefinite, aimless expression and gazing into distance won't quell such turbulence. Shortly after I called him to look at the matches a color-blind boy had made with Holmgren's test, in which he saw, as he said, nothing out of the way or to comment on. It then flashed over me that he was color-blind, which, upon examination, proved true. His peculiar look was this of the color-blind. I met him once afterward, coming hastily through a door in the post-office, when I caught his eyes first, and instantly noticed the expression as that of the color-blind, before I recognized the rest of his face.

I have thus briefly called attention to this singular peculiarity, which may prove of value in the detection of color-blindness. I would attempt no explanation of it. Ocular expression is of course due to the muscles of the lids and face. As they, however, are called into play from mental impressions derived through the eye, it does not seem impossible that the color-blind eye may have its own peculiar facial expression.

A CASE OF PERSISTENT HYALOID ARTERY.

BY WILLIAM S. LITTLE, M.D.,

PHILADELPHIA, PA.

WHILÆ examining with the ophthalmoscope the right eye of a boy, six years of age, who had been sent to me by Dr. Joseph Hearn, of Philadelphia, for the correction of a strabismus convergens affecting the right eye, a persistent hyaloid artery was observed. The boy is small and spare, has been treated successfully for hip disease by Dr. Hearn, and has had the same arm fractured twice.

With the ophthalmoscope the optic nerve, without a physiological excavation and with slight pigmentation on its nasal side, is seen with a +4D.

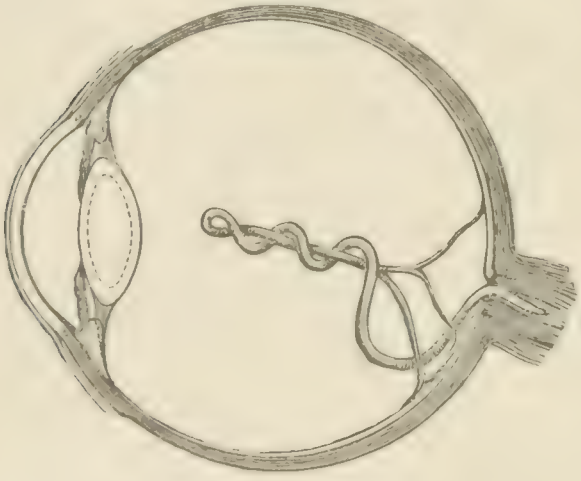
The appearance of the vessels on the face of the nerve is as follows: on the upper and outer quadrant are crowded, very circuitous,

and divide on the disc instead of on the retina as is usual; the artery macularis comes from the depth of the nerve, toward the periphery, near the horizontal diameter of the disc.

On the upper and inner quadrant, the artery nasalis superior is circumflex and divides on the disc; the vein nasalis superior passes directly to the centre of the disc.

The inner and lower quadrant has no medialis vein or artery passing from the centre over it; but branches from the nasalis inferior artery and veins take their place.

The outer and lower quadrant, has the macularis vein upon it; between the two lower quadrants lies one large vein, representing the temporalis inferior and nasalis inferior veins; there is no temporalis inferior artery or nasalis inferior artery on the disc or on the retina, but the vessel to be described takes their place, as will be shown in the description.



The hyaloid artery observed arises about the centre of the disc; on the disc it passes downward, curving slightly toward the nasal side, then curves outward to the edge of the disc; then takes a curve downward, forward, inward, curving gently upward, forward, outward; then sharply downward, forward, inward; sharply upward, forward, outward; sharply downward, forward, inward; sharply upward, forward, outward; then turns directly outward upon itself on a horizontal plane, and passes directly back through the curves made by its progress. These curves number three; two anteriorly surrounding the vessel as it passes backward; the third is about three times as large as the others. When the vessel passes backward under the last curve (posterior one), best seen with a +6D, it bifurcates, sending one branch curving downward toward and on the retina, this becoming the temporalis inferior artery; the second branch at the bifurcation of the artery goes toward the retina on the nasal side, below the horizontal plane, and before it reaches, divides into two branches, one representing the artery medialis on the retina, and the other the nasalis inferior artery.

Dr. J. M. Taylor, of Philadelphia, has made a very accurate

J. Madison Taylor, M.D.
1881.

sketch of the fundus of the eye, showing the vessel in question and the general distribution of the vessels on the disc and retina; it is a three-quarter outward appearance of the disc and vessel. He has also made a profile picture (diagrammatic) from the nasal side (see page 212). Its shape resembles a cork-screw. The calibre of the vessel corresponds to the other arteries in the nerve and retina. Its color is the same, except where it forms the loop on its extremity, where it is much darker. To see it on the disc a +4D is used; at its bifurcation a +6D; the extreme end is seen with a +9D, and at times a +12D, as it moves toward the extremity; this shows the amount of oscillation.

From its color I believe blood to be passing through it, and in its final distribution the vessels take the place of those that are generally present on the retina, arising from the optic nerve. The position of the vessel, and coming so far forward toward the posterior surface of the crystalline lens, enables it to be called a persistent hyaloid artery; though I have thought at one time it might be a retinal vessel wandering through the hyaloid, the portion going to the crystalline lens having been absorbed.

Heretofore I have seen only one case, of persistent hyaloid artery, and that was rudimentary and bloodless, and seen only close to the disc. Dr. Risley, of Philadelphia, has seen the patient, and I regret that distance has prevented the attendance of the boy.

The left eye presented no abnormality as to the vessels.

I obtained with a +4D for the right eye $\frac{20}{c}$, it being amblyopic. The left eye required a +3D to obtain $\frac{20}{xx}$.

I divided the tendon of the internal rectus of the right eye, correcting the strabismus convergens.

As the boy develops, I desire to watch the condition of the vessel.

The hypermetropia was no doubt the cause of the squint.

AN OPERATION FOR CLOSED PUPIL WITH ANTERIOR SYNECHIA, USING THE *PINCE-CISEAUX* OF WECKER.

By JOHN GREEN, M.D.,

ST. LOUIS, MO.

SINCE the introduction of the *pince-ciseaux* by Dr. de Wecker, I have used it in preference to other instruments in most cases in which I have wished to make a central new pupil in an aphakial eye. At a former meeting of this society I described a special method of iridotomy,[1] in which the instrument had rendered me excellent service—an operation which I have continued to perform in suitable cases, and which has uniformly proved entirely satisfactory in my hands. I have now to report an operation in which I have used the *pince-ciseaux*, first to divide an anterior synechia, and immediately after to extend the opening thus made in the iris, so as to secure a central and nearly circular pupil.

Mary L. W——, seven and a half years of age, was cut in the left eye by a pen-knife, February 6, 1881, the wound involving cornea, iris, and lens. When I first saw her, eleven days after the injury, the cornea showed a nearly horizontal linear cicatrix, about five millimetres in length and a little more than a millimetre below its centre, with the lower pupillary margin engaged in the scar, and the strongly contracted pupil entirely obstructed by the opaque lens. Under atropia the pupil dilated only at a single point, and very slightly. The eye recovered without further accident, but with a practically occluded pupil and with a shallow anterior chamber, due to the fact that the iris was drawn forward toward the point at which it was attached to the cornea.

June 16th, about four months and a half after the date of the injury, and after all traces of irritation had disappeared, the anterior chamber was opened by means of a Graefe cataract-knife, in a

[1] Trans. Am. Ophth. Society, 1875; Wecker's Chirurgie Oculaire, pp. 123–125. Paris, 1879.

horizontal line midway between the cicatrix of the original wound and the lower corneal margin. The *pince-ciseaux* was then introduced, and the anterior synechia snipped through close to Descemet's membrane. Lastly, one blade of the *pince-ciseaux* was passed through the button-hole thus made in the iris, and the iris, lens-capsule, and any newly formed tissues, were divided by a single closure of the instrument, in a line about four millimetres long and crossing the old pupil.

The immediate effect of the operation was the formation of a clear central pupil and a conspicuous deepening of the anterior chamber. With the exception of a small clot, which partially filled the new pupil, there was no bleeding. Healing was rapid and without complication.

At the date of this writing, one month after the operation, the eye is perfectly free from irritation, the anterior chamber is of good depth, and the new pupil is small, central, and of nearly normal appearance. Careful examination reveals a thin film behind the pupil, which it may probably be well to divide by a needle operation at some future day. With a correcting-glass of 12 d. V. $= \frac{xx}{xxii}$ Snellen.[1]

The conditions which determined the operation in this case are very frequently met with as sequelæ of complicated wounds of the cornea. The *pince-ciseaux* offers the great advantage that it enables us to make a free division of a very dense and tough membrane within the eye, while its use is attended with little or no traction upon the iris or other tissues.

[1] December 9, 1881, nearly six months after the operation, V. measures $\frac{x}{xx}$.

CONGENITAL PARALYSIS OF BOTH ABDUCENS AND BOTH FACIAL NERVES.

By G. C. HARLAN, M.D.,

PHILADELPHIA, PA.

A YOUNG man, eighteen years of age, a cooper by trade, well developed and in excellent health, came to the Wills Hospital on account of defective vision and deformity of the eyes. The condition was noticed soon after his birth, and has not altered since. He has been able, with some difficulty, to get a common school education and to learn his trade, at which he is now working.

There is complete paralysis of the sixth and seventh nerves on both sides. The eyes are turned strongly inwards, with no trace of any power of external rotation, though the function of all the orbital muscles but the abducent seems normal.

The orbicularis is entirely powerless. When the patient is told to shut his eyes, they roll upward so as to conceal the cornea beneath the upper lids. There is a slight upward tendency of the axes when the eyes are at rest. The surface of the cornea—particularly of the right—is just perceptibly dulled, though the defect in vision seems to be due principally to epiphora, which is very marked, as the puncta do not touch the balls. Vision is O. D. $\frac{20}{120}$ and O. S. $\frac{20}{C}$; not improved by glasses. Ophthalmoscopic examination, on account of the position of the eyes, the slight haziness of cornea and the epiphora, is extremely unsatisfactory, but the fundus seems normal. He uses the left eye by preference for near vision, but can use either. Fixation is with the macula in each eye. In endeavoring to make out the test-letters at 20′, he accommodates the position of his head to the eye in use, but ordinarily there is no such movement of the head. In walking the head is held quite straight, and he probably uses the right eye for objects on the left side, and the left for objects on the right. He has never had diplopia. The epiphora was considerably relieved by slitting up the canaliculi and cutting out the inner lips of the wounds, but the patient failed to present himself at the hospital for some weeks, and the canals partially closed. I have

thought of endeavoring to give a better position to the eyes by dividing the internal recti freely and removing a fold of the conjunctiva and subconjunctival tissue over the outer side of the balls.

The immobility of this man's face is very striking; it is as smooth and expressionless as if carved out of wood. The passions and emotions of eighteen years have left no trace upon it, and time has changed only its size. A photograph taken recently might almost pass for an enlarged copy of one that was taken in early childhood. I was at first somewhat puzzled by a slight downward movement of the corners of the mouth, but discovered that it was accomplished by the platysma. There is no paralysis or impairment of any other nerve than the sixth and seventh. Hearing is good and speech is affected only by absence of motion of the lips. There is no serious inconvenience in mastication, and no overflow of saliva. I can detect nothing unusual in the muscles of the palate, and am satisfied that there is no impairment of taste or sensation in the tongue. The complete activity of the sense of taste was confirmed by Dr. Chas. K. Mills, who made a careful examination in regard to this point.

The eye-symptoms in this case—extreme internal strabismus, lagophthalmos, and epiphora—offer nothing worthy of special remark, except the rarity of their congenital cause, and are interesting only as a curiosity. There are, however, several considerations of interest in connection with disputed points, as to the origin and distribution of the nerves involved. The complete congenital paralysis of these two nerves, widely separated in their course after they leave the brain, points to a central cause, and supports the view that they arise from the same nucleus. Cruveilhier says: "It is easier to trace the origin of the sixth pair in the mammiferous animals than in man. In the former Gall has followed the roots of the sixth pair to the sides of the pyramids; Herbert Mayo makes them traverse the protuberance to reach the posterior part of the medulla oblongata. Stilling has followed the nerve through the protuberance to the floor of the fourth ventricle, where he makes it terminate in a nucleus of gray substance, in common with the facial. But, according to Schroeder van der Kolk, the fibres of the oculo-motor curve outward, and simply traverse the nucleus of the facial, and reach the superior surface of the bulb, to terminate probably in a distant nucleus." I believe it is now generally agreed that the deep origin of both the sixth and seventh nerves is somewhere in the floor of the fourth ventricle.

Perhaps no other nerve has received a larger share of discussion

than the tympanic branch of the seventh, or is at present the subject of a greater diversity of opinions as to its origin, distribution, and function. Recent positive observations upon the effects of division and irritation of this nerve in the tympanum would seem to leave little doubt that it supplies nervous filaments of taste, and perhaps of sensation to the tip of the tongue. Its effect upon the salivary secretion offers a still wider field of discussion, which it would be out of place to enter upon here. Oscar Wolf, in a paper "On the Function of the Chorda Tympani," in a recent number of the *Archives of Otology* (vol. ix., No. 4), states that the part of the tongue paralyzed by accidental section of the nerve in the tympanum (paralyzed both in taste and sensation) "formed a right-angled triangle, whose hypothenuse was formed by the edge of the tongue, and whose longest side was 2 ctm. in length;" but admits that the *origin* of the nerve-fibres supplying this portion of the tongue is still an unsolved problem. The preservation of taste with complete paralysis of the facial indicates that the deep origin of the chorda tympani is not the same as that of the facial. Supposing the filaments of taste and sensation to be derived from the fifth, or from the nerve of Wrisberg, the absence of any symptom of disturbance of these filaments confirms the supposition that the cause of the paralysis in this case is central, and dependent upon defective development, or intra-uterine disease, of a small spot in the fourth ventricle.

The symmetrical character of the lesion makes it more curious, but at the same time less useful to the physiologist, as it prevents it from throwing any light upon the important and vexed question of the decussation of the fibres of the seventh nerve.

THE TREATMENT OF SCARS OF THE FACE INVOLVING THE EYELIDS, DIRECTLY OR INDIRECTLY.

By CHARLES STEDMAN BULL, M.D.,

NEW YORK.

Scars upon the face, in the vicinity of or directly involving the eye-lids, have long been a subject of interest to ophthalmic surgeons, and various have been the attempts to remedy the defects produced by the contraction subsequently occurring in them. The main interest has apparently centred in those scars, more or less extensive, due to burns or to extensive laceration and destruction of soft parts from wounds, chiefly gunshot, like those received in battle. The same or an equal degree of interest does not seem to have been attached to those depressed scars due to long-continued glandular abscesses, or to chronic bone disease with subsequent exfoliation of bone. The object to be gained by operative interference in these cases is two-fold, viz., to remedy an unpleasant deformity, and to protect the eye from injury by restoration of one or both eyelids, in whole or in part. Whether the case be one of partial or complete ectropium of one or both lids, caused by the cicatrization following a burn, or of partial or complete destruction of one or both lids, the operation deemed necessary is some form of blepharoplasty, either by sliding flaps or the transplantation of a flap with pedicle from some neighboring region, or by the process of grafting without pedicle by the transplantation of skin in numerous small pieces or in one large graft, from some distant region. All of these various operations occasionally fail in their ultimate results, and this from no fault in their technical performance. No surgeon, however experienced, in his desire to correct a deformity, can ever trust implicitly in the persistence of a large scar; and we should be very cautious in attempting to remove the effects of contracting bands of tissue by operation, for every new incision that is made is eventually filled up by the formation of this same granulation tissue, in which the same contracting process goes on as in the original scar. The new-formed granulation tissue is gradually changed into

fibrous connective tissue, and then becomes true cicatricial tissue, made up of bundles of connective-tissue fibres, as are seen in tendons and fibrous membranes. This conversion of the exudation cells of granulation tissue into filaments of cicatricial tissue ending in contraction seems to be very much of a mechanical process. We all recognize the fact that the changes taking place in a cicatrix do not cease with its formation, for the gradual contraction continues for a considerable, though very variable, period of time, and does not attain its maximum until long after the completion of the cicatrization. In view of these facts, it has seemed to the writer that operations for blepharoplasty are sometimes undertaken too early, before cicatricial contraction has ceased, and that, in some of the cases at least, the lack of ultimate success may be thus explained. Another point to be remembered is that the contraction in scars from burns is greater than from any other cause, and the contracting process lasts longer. Still another point to be remembered is that the degree of contraction, though largely dependent on the nature of the agent that caused it and upon the extent of its destructive action, also depends somewhat upon the seat of the scar. If it is in a region where the skin is naturally tense, as over bony prominences, the contraction will be slighter than where the skin is naturally loose. A scar over the superior orbital margin, or on the side of the nose, or over the zygoma, will contract less than one over the lower orbital margin or on the cheek. But, on the other hand, in injuries or burns of those regions where the skin is naturally tense, the resulting cicatrix is in most cases immovable, in this regard being almost characteristic. In superficial caries with an external opening, when the bone disease is arrested and the necrosed portions have been detached and cast off, repair goes on in the usual way by the formation of granulation tissue, which is subsequently converted into fibrous tissue, becomes continuous with bone or periosteum, contracts and possibly ossifies, and thus the depressed cicatrix is caused. This is well described by D. Hayes Agnew in his last work on Surgery.

We should not be too hasty in operating for deformities about the lids produced by the scars resulting from bone disease, for very often these scars break down from pressure or tension, or from some constitutional cause, such as struma, or scurvy, or alcoholism. Such spurious cicatrization is not infrequently seen over fistulous openings from bone caries; the surface of the scar retains a pale blue hue, sometimes for a long period, and conceals a granulating tissue below. Such scars never attain the vitality of older structures, and

the larger they are the less vitality, as a rule, do they possess. Any operative procedure to relieve the deformity accompanying such a scar would be almost certain to fail, whether by blepharoplasty with sliding flaps or with a pedicle, or by grafting without a pedicle. Excision of the entire scar, and, if bone disease be present, removal of the affected portion by forceps and scraper or chisel, must precede any successful attempt at blepharoplasty, if a solid cicatrization is to be obtained.

Certain observations of the writer upon the natural course of development and transformation in scars of the face, involving the lids directly or indirectly, have led him to think that the natural process of change may be assisted and perhaps hastened by a combination of massage and traction, and thus the parts made more movable and put into a better condition for the performance of any blepharoplastic operation, the chances of the success of which are thereby enhanced. We know that in time the tissue of a scar assimilates more and more to the structure of a part, and its deep attachments become more movable. The scar which at first is thin, bluish, and shining, and composed of undeveloped fibrous tissue, becomes white and depressed, and its structure comes very slowly to resemble that of the part where it is situated, though of course it never becomes true skin. The loosening of such scars from their deep attachments is due to a slow absorption of certain tissue-elements and the formation of a loose net-work of connective tissue, more or less elastic and pliable, at the base of the scar. Great changes occur in this regard in course of time; but, as Hayes Agnew says, external agents, such as rubbing and kneading the parts, or massage, and even soaking and steaming the parts, are useful in hastening the process of interstitial absorption. We can readily see that the act of massage, by pressure on plastic deposits, causes an absorption of a certain amount of intercellular material, and thus the texture at the base becomes more open. Persistent rubbing and kneading of scars of the face, both those due to burns and those resulting from bone-caries, as preparatory to blepharoplasty, have, in a number of instances in the writer's experience, yielded most excellent results. Adhesions of scars, slight or extensive, to the subjacent parts, have been slowly, cautiously and painlessly detached, and a gradual absorption of the firm material in the dense part of the scar has been brought about. So considerable has been the result obtained in some cases that the writer has come to regard this gradual extension and loosening as an important part of the treatment in these

cases. It is astonishing how soft and pliable the seams in these scars become under this treatment, and this pliability and elongation of the cicatrix is probably permanent. The depressed scars due to bone disease, in which, after the casting off of the sequestrum, the fistulous sinus has closed and the scar has become depressed and firmly adherent to the bone or periosteum, generally prove intractable to this method of treatment by massage. In these cases it will be necessary to divide the adhesions subcutaneously, and then keep up motion in the parts by rubbing, until all danger of re-adhesion of the old attachments has passed. This operation has been advocated by Mr. Wm. Adams, of England, who has practised it in a number of cases with success. (See *British Medical Journal*, April 29, 1876). He describes it as an operation for the obliteration of depressed scars after glandular abscesses or exfoliation of bone. The operation consists, first, in subcutaneously dividing all the deep adhesions of the cicatrix by a tenotomy-knife, introduced in healthy tissue, a little beyond the margin of the cicatrix, and carried down to its base. Then the depressed cicatrix is carefully and thoroughly elevated, lifting it up as it were so that the cicatricial tissue remains prominently raised, and the cicatrix maintained in its elevated position for several days by passing two hare-lip pins or needles through the base at right angles to each other. The needles or pins are generally removed on the fourth day, and the cicatricial tissue, somewhat swollen and infiltrated, is allowed gradually to subside to the proper level of the surrounding skin. Adams thought that after subcutaneously dividing all the deep adhesions of the cicatrix, elevating the cicatricial tissue, and retaining it so raised for a few days, the depression would become filled up by inflammatory infiltration, so that the scar could not again sink below the level of the surrounding skin; the depression would thus become obliterated, and all the adhesions of the cicatrix would be effectually removed. The doubtful point is whether, in the course of time, absorption and re-contraction of the inflammatory lymph would take place, so that the depression would return.

After the operation the cicatricial tissue always loses its shiny, membranous character, and becomes looser and of an opaque white color.

So far this method of treatment of depressed, adherent scars from bone-caries has been employed by the writer in but three cases, but in all with satisfactory success. One was for complete eversion of the lower lid by a broad, depressed cicatrix, firmly adherent to the

superior maxilla below the orbital margin. The original trouble was probably extensive caries of the bone from scrofulous disease. After the loosening of the scar had been done, and subsequent massage treatment had been carried on for four weeks, the lid was inverted, and the space opened by the incision was filled in the ordinary way by transplantation of a flap of skin with pedicle from the temple.

The second case was also complete eversion of the lower lid from the same cause, the original injury having been a pistol-shot wound. The adhesions here were not so broad as in the first case. The subsequent method of treatment was the same.

The third case was one of almost complete eversion of the upper lid, produced by a long and somewhat broad scar on the forehead, just above the eyebrow, the cicatrix being markedly depressed and firmly adherent, throughout its whole length, to the bone. There had been quite extensive destruction of bone from a severe blow received many years before. In this case also the same steps were carried out, and the resulting gap filled by transplantation of a flap from high up on the forehead. As before stated, the ultimate result was excellent in all the cases.

A SOURCE OF DANGER IN THE FRAME OF THE EYE-GLASS AS COMMONLY MANUFACTURED.

BY F. B. LORING, M.D.,

WASHINGTON, D. C.

THE two following cases are not remarkable in themselves, nor can they claim any special interest beyond the peculiar manner in which the injury was inflicted, and the fact that, as long as eye-glasses are manufactured on the present system, the ametropic community will be liable to similar accidents of a greater or lesser degree. Some months since, M. L——, a student, consulted me in regard to an injury of the right eye, received during a frolic with some companions, from the blow of a hard pillow on the corresponding side of the head. The glass had been driven against the eye, and the small, acorn-pointed spike that is always placed by the maker on the *inner* side of the handle of the frame, as a means of locking the glasses together when closed, had penetrated the conjunctiva and subconjunctival tissue, and, driven by the lateral force of the blow

in a direction upward and inward, had inflicted a rent of about two-thirds of an inch in length. This had been treated by a poultice and the application of tea-leaves, and an attack of purulent conjunctivitis had resulted. This was quickly subdued, and the wound healed rapidly under washes of boracic acid and rose-water. In the second case, M. F——, a teacher of sparring, received, during a glove-fight, a "cross-counter" over the right arm, which knocked him completely down, and again drove this small spike into the tissues of the eye, to such a depth that his attendant stated that it required some effort to disengage it, the bulbous point having apparently acted as a barb. The gloves that were used in the encounter were those that are technically known as "hard," and were practically useless as a means of protection against injury. The eye and surrounding tissues were in a state of intense congestion and inflammation at the time of my first examination, some ten days after the injury was received. The conjuctiva was congested and chemotic, and in the lower part distended with effused blood. The cornea was clear and transparent. The iris was discolored and contracted to a pin's point, and the pupil completely plugged with lymph, adhesions having formed round its entire circumference. At a point about four lines outward from the lower edge of the cornea there was a small, jagged perforation, the mouth of which was slightly elevated and filled with a plug of yellow pus. The tension of the eye was greatly diminished, but, owing to the occlusion of the pupil, no ophthalmoscopic examination was possible. V. was entirely wanting. Under treatment the pain and inflammation were subdued and the wound closed; the globe, however, gradually contracted, phthisis bulbi ensued, and the patient was discharged with no perception of light in the injured eye. As has been shown, the injury in both these cases was the direct result of having the catch placed on the inner side of the frame, and I have been in the habit latterly of having it entirely removed in those cases where the patient wears his glasses constantly, and in all others of having it put on the *outer* side of the frame, a corresponding twist, if necessary, being given to the spring.

Another interesting point, particularly in the latter case, might be found as an argument against the statement lately made abroad, that the use of glasses renders the wearer timid, and diminishes the taste for athletic sports. In this case we have a man who deliberately enters the prize ring with his glasses on, and during the past year I have seen a conjurer who juggled with heavy knives with a semi-

corrected myopia of $\frac{1}{4}$, and an astigmatic ball player, who habitually caught behind the bat in his glasses, the only protection to his face being a band to guard his teeth; and I have no doubt that many gentlemen here have similar cases in their note-books.

REPORT OF A CASE IN WHICH USEFUL VISION WAS MAINTAINED THROUGH A NUMBER OF YEARS BY THE AID OF A TOTALLY DISLOCATED LENS.

BY SAMUEL THEOBALD, M.D.,

BALTIMORE, MD.

THE following remarkable case of useful vision maintained through a number of years by the aid of a totally dislocated lens, is believed to be unique:

J. B. K——, a delicate-looking lad, twelve years old, of German parentage, was brought to me by his father in December last, for advice regarding his sight, which had been defective from infancy. Upon examination the eyes were found to be slightly hyperæmic, the anterior chambers abnormally deep, the irides tremulous, and the pupil of the right eye to occupy an eccentric position very near the upper margin of the cornea, the tension of each being somewhat below normal. Of course, absence or dislocation of the lenses at once suggested itself, and upon resorting to the ophthalmoscope I discovered without difficulty in the left eye that the lens was dislocated directly downward, that it was lying some distance below the pupil, was freely movable, and was not cataractous. Owing to the eccentric position of the pupil in the other eye, a satisfactory examination could not be made until atropia had been instilled, when exactly the same condition as in the left eye was found. Nothing else abnormal was discovered, except about each disc a myopic crescent, and a general thinning of choroidal pigment.

After making this discovery I was somewhat surprised to learn that, although the boy had never worn glasses, he had attended school regularly, and had not only been able to study his lessons satisfactorily, but had been much given to reading for pleasure—in fact, was quite a book-worm. Handing him Jaeger's test-types, I requested him to read the smallest letters which he could distinguish, whereupon he bent his head well forward, with his face toward the floor, placed the type within one and one-fourth inch of his left eye,

and read off No. 1 with perfect fluency. When directed to read with his head erect, he could scarcely make out with this eye No. 17. There was but one explanation of this phenomenon: by the forward movement of his head the lenses were thrown into position behind the pupils (or, at least, this was what took place in the left eye), and by this means he obtained a distinct retinal image. At a subsequent examination I satisfied myself that this was what occurred, by watching the lens with the ophthalmoscope as it glided into position. His father informed me that he had always read in this manner, and that from his earliest childhood he had been in the habit of using his eyes in this peculiar fashion. With the right eye (before instillation of atropia) he could with head erect distinguish with difficulty J. No. 11, but by inclining his head could do no better. His distant vision, which was next tested, gave the following result: each eye sees $\frac{15}{CC}$; L. with $+\frac{1}{7}$ V. $= \frac{20}{LXX}$; R. with $+\frac{1}{24}$ V. $= \frac{20}{LXX}$. No further improvement in the vision of the right eye could be obtained from the addition of a stenopæic apparatus. The test with convex glasses for near vision not being very satisfactory at his first visit, glasses for distance were prescribed (L. $+\frac{1}{7}$ s.; R. $+\frac{1}{24}$ s.), and he was told to report in a few days. In eleven days he returned, having in the meantime worn his glasses with much satisfaction. His vision with them had improved slightly: L. V. $= \frac{20}{LXX}$ and two letters $\frac{20}{L}$; R. V. $= \frac{20}{CC}$. As a result of various trials with reading-glasses, I finally selected for the left eye $+\frac{1}{3\frac{1}{2}}$ s., with which he could read J. No. 4 at about 6″; and for the right eye I prescribed a plain glass, thinking that, as it had not previously taken part in near vision, it would be safer not to induce it to do so now, and especially since its vision was much below that of the other eye. The left eye, even with $+\frac{1}{2}$, could not decipher J. No. 1, although with the dislocated lens, as I have said, it could read it with facility.

Observing how very close the type was held to the left eye when being read through the dislocated lens, it occurred to me to test the action of concave glasses upon the sight while the lens was kept behind the pupil by the inclination of the head, and in this way one of the most interesting points of the case—*the extreme convexity of the displaced lens*—was brought out. Passing from weaker to stronger glasses, I finally found, to my surprise, that with $-\frac{1}{4}$ s. the left eye could still read J. No. 1 with ease; that with $-\frac{1}{2}$ s. it could make out some words of No. 1, and could read No. 2, the page being held a little less than 2″ from the eye; and that even with two $-\frac{1}{2}$ s. glasses combined it could read No. 4 at 3″. I next placed Snellen's types

upon the floor, and the patient, standing over them with his head forward, the letters being 4′ from his eye, made out several letters of No. XXX. through two $-\frac{1}{2}$ s. glasses combined with $-\frac{1}{6}$ s., that is, practically, through a lens of $\frac{6}{4}''$ negative focus. By these tests, therefore, it was shown that with the lens in position, a M. of at least $\frac{1}{1\frac{1}{8}}$ existed. Now, as this eye, with the lens below the line of vision, required for distant sight only a $+\frac{1}{4}$ glass, it evidently was myopically elongated; but, admitting that it would have needed $+\frac{1}{3}$ if emmetropically formed, we could account in this way (allowing half an inch for the distance between the glass and the nodal point of the eye) for M. of scarcely $\frac{1}{4}$ ($\frac{1}{4\frac{1}{16}}$)—less than one-third of what, with the lens in position, was manifest. Evidently, then, this extreme degree of M. was due to unusual convexity of the dislocated lens; indeed, the focal length of the latter must have been not only much shorter than the focal length of the *unaccommodated* lens of the diagrammatic eye of Helmholtz, but somewhat less even than that given by him for the *accommodated* lens. Since it converted H. $\frac{1}{6}\frac{1}{2}$ into M. $\frac{1}{1\frac{1}{8}}$, its focal length (assuming that its position, as regards distance from the retina, was as favorable as if it had been normally suspended behind the iris, which probably was not the case, as it did not press the iris forward enough to appreciably lessen the unusual depth of the anterior chamber) must have been but little more than $1\frac{1}{5}''$ (Paris), or more exactly $1.2293+''=33.269+$ mm.; whereas, in the diagrammatic eye, the focal length of the unaccommodated lens is 43.707 mm., nearly $1\frac{2}{3}''$ (Paris), and of the accommodated lens, 33.785 mm., very nearly $1\frac{1}{4}''$ (Paris). We would scarcely be justified in assuming that the lens in this instance was equivalent to a normal lens *just liberated from the restraining influence of its ciliary attachments*, nevertheless, the extreme convexity which it exhibited is significant, and seems to me to afford additional evidence in favor of the now generally accepted, though as yet not proven, theory of accommodation propounded by Helmholtz.

I have only to add, in completion of the history of this case, that upon re-examination in May, after the glasses prescribed had been worn nearly six months, I found that the eyes were less hyperæmic, and that the vision of each had improved somewhat: L. with $+\frac{1}{4}$ V. $=\frac{7}{7}$ except S; R. with $+\frac{1}{2\frac{1}{4}}$, V. $=\frac{7}{7}$, and C of $\frac{5}{7}$; and with his reading glass ($+\frac{1}{3\frac{1}{4}}$) the L. could now make out J. No. 1. He also proved to me that he had not lost the faculty of using his dislocated lens, by reading J. No. 1 with it as fluently as he had done before.

REMARKS.

DR. GEORGE C. HARLAN, of Philadelphia, referred to a case of total dislocation of the lens with far vision. The patient was hysterical, the eye became irritable, seemed to be a source of irritation, photophobia supervened, and finally it became necessary to extract the lenses from both eyes. The lenses were entirely transparent. The dislocated lens was always in front of the pupil, there was no attachment whatever, and the lens was entirely free.

DR. H. W. WILLIAMS, of Boston, referred to a case in which the eye had been struck with a piece of wood, and the lens was so dislocated that it hung merely by a hinge-like portion at the lower part. When the patient lifted his head the lens tipped backward, and when he stooped forward he saw distinctly, and without it he saw with a cataract-glass. As there was good vision with either eye, he thought it was unnecessary to interfere at all with the injured eye.

THE COMPARATIVE VALUE OF THE MYDRIATICS.

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UNTIL a comparatively recent date, sole reliance was placed upon the solutions of sulphate of atropine where a mydriatic was desired in ophthalmic practice, whether for the treatment of inflammations of the eye or for paralyzing the accommodative function. For either of these purposes it was found very useful and efficient; but the many days required to dissipate its influence, even after the instillation of a single drop of a four-grain solution, made it extremely desirable that some agent should be secured which would possess in a satisfactory degree the sedative and paralyzing properties of the atropine, but would also rapidly resign its control over the accommodation.

Recent investigation has furnished such agents, and experience in their employment has seemed to demonstrate their usefulness in correcting errors of refraction; and they now bid fair to replace the old mydriatic. In the treatment of inflammations also, they seem quite as efficacious as atropine; but extended observation in this direction is still wanting.

The investigations of Dr. William F. Norris and others with sul-

phate of duboisine have thrown much light upon the value of that drug. My own studies of its value have been already published in the *American Journal of Medical Sciences* for April, 1880; and the same, with additional cases and a tabular statement of the whole, in the *Louisville Medical Herald* for August, 1880. Similar investigations with the hydrobromate of homatropine and the sulphate of hyoscyamine have also been brought forward, the former in the *American Journal of the Medical Sciences* for January, 1881; the latter in the *Philadelphia Medical Times* for February 26th of the same year.

The publication on the sulphate of duboisine was based upon one hundred and forty cases, and seemed to justify a series of conclusions which are here reproduced: "1st, that in solutions not stronger than two grains to the ounce the sulphate of duboisine is free from danger; 2d, the two-grain solution of the sulphate of duboisine paralyzes the accommodation more rapidly than a four-grain solution of sulphate of atropine; 3d, that the duration of its effect is less than half that of the sulphate of atropine; 4th, that the preparations now in the market are more liable to irritate the conjunctiva than neutral solutions of sulphate of atropine; 5th, that in the treatment of inflammations of the eye duboisine may be used as a substitute for atropine."

The conclusions reached from the use of hydrobromate of homatropine in *thirty-seven cases* were formulated as follows: "1st, that hydrobromate of homatropine, in solutions of two, four, and six grains to the ounce, is competent to paralyze the accommodation; 2d, that in from sixteen to thirty hours the paralysis entirely disappears; 3d, that it is no more liable to produce conjunctival irritation than the salts of atropine or duboisine; 4th, that it produces far less constitutional disturbance than either the atropine or duboisine."

The paper on the sulphate of hyoscyamine was a preliminary statement containing the results obtained from a careful record of its use in eight cases. No conclusions were formulated upon so limited an experience, but the results were so encouraging that its employment has been continued. The observations made upon its use in the first eight cases, published in the *Medical Times*, are thoroughly in accord with the later experience.

The object of the present paper is to give the results of additional experience in the use of these drugs, and to sum up and place on record in the annals of this society, what has seemed to be their

comparative value as employed for the purpose of determining and correcting errors of refraction.

The investigations in the use of homatropine have been extended, and a total of about one hundred and thirty cases reached. Of these, in one hundred and eleven cases careful records of the length of use, the duration of the paralysis and the full history of its action, have been kept. These results only confirm and emphasize those before reached, and call for no modification in the conclusions already given. For some months past the sulphate of hyoscyamine has been used in the majority of private cases requiring a mydriatic, and the number is now considerably over one hundred. Ninety of these have been carefully studied, and upon them the following remarks are based. In eight of these cases an accurate daily record was made of the returning range of accommodation, in order to ascertain the exact time of its full recovery. In twelve other cases the date of the full return of the accommodative function was noted, but the same care was not exercised to determine the *earliest* time of its re-establishment. Upon these twenty cases the average time required for its return has been estimated, with the result given in Table I.

The conclusions which have seemed to be justified by its use in these ninety cases have been confirmed by its further use, and may be stated as follows:

First.—That the sulphate of hyoscyamine in a solution of gr. ij. to fl. ℥ j. is competent to quickly paralyze the accommodation.

Second.—That it does not cause more conjunctival irritation than solutions of the sulphate of atropine.

Third.—That the duration of its influence over the accommodation is less than half that of atropine.

Fourth.—That it causes less constitutional disturbance than a corresponding solution of the sulphate of duboisine.

The further use of sulphate of duboisine has only served to confirm the conclusions already published and given above.

The long experience which has been had in the use of the sulphate of atropine, and the numerous observations which have been made as to its physiological action, have placed its merits upon quite a certain footing, and made its properties the natural standard of comparison. Thus, it is well known that, after the instillation of a four-grain solution of sulphate of atropine, the near point recedes to coincide with the far point of distinct vision. This result, however, has been shown by experience not to follow always upon the single

instillation, so that it has been found necessary in practice to continue the use of the solution, instilling it three times daily, for some time, before all range of accommodation has entirely disappeared. The method for determining whether this result has been attained is by the addition of a convex lens, *e.g.* + $\frac{1}{8}$, to the correcting glass. If then the paralysis be complete—if *p.p.* = *p.r.*, Jaeger No. I. can be read at twelve inches, the focus of the lens, but theoretically no nearer nor farther, due allowance being of course made for the distance of the convex glass from the nodal point of the eye. Many persons, however, are still able, after prolonged use of atropine, to read Jaeger No. 1, under the above conditions, from eleven to twelve and one-half inches, for the reason that an absolutely clear image is not necessary in order to read Jaeger No. 1. When the remaining range is no greater than one or one and one-half inches, the paralysis may be considered complete. It has been with this standard, therefore, and by these methods, that the newer mydriatics have been compared in investigating their power over the function of accommodation.

In cases of asthenopia from eye-strain consequent upon some defect in the refraction of the eye, the paralysis of the accommodation is not the only thing to be accomplished by the use of a mydriatic; or rather, the success of a mydriatic in the treatment of asthenopia depends largely upon another of its properties. These eyes almost invariably present retino-choroidal irritation, often to a marked degree, and the undue sensitiveness to light, etc., must be removed before the accommodation will become sufficiently quiet to permit the accurate determination of the correcting-glass. Just as in some inflammatory diseases, notably phlyctenular keratitis, full dilatation of the pupil can be gained, if at all, only by very frequent instillations of the mydriatic, on account of the great irritability of the iris, so in these cases the ciliary muscle, in spite of the full use of the atropine, may be awakened to activity by the effort at correction. It has therefore been necessary to continue the mydriatic in such cases until the irritation and the symptoms depending upon it have disappeared. So, in comparing these drugs, not only their power over the ciliary muscle of the healthy eye should be determined, but also the extent to which each possesses the equally important property of allaying the irritability of the weak asthenopic eye. Under the use of atropine I have constantly seen the asthenopic symptoms subside, at the same time that the attending undue capillarity of the nerve-surface, the haziness of the retina, and the woolliness of the

choroid would disappear, and that ordinarily in a few days. Therefore, in the study of the newer mydriatics the very important question has been presented, whether, even if they were found capable of paralyzing the accommodation, they would act equally well in this respect.

The following table and those on pages 235 and 244–254, will serve to demonstrate the comparative value of the drugs in these two important particulars, and thus furnish positive indications of their relative utility in the daily routine of practice. For, since the glasses have been ordered only after the subsidence of the irritability of the eyes and the complete paralysis of the accommodative power, it follows that the length of time for which it was found necessary to use the different mydriatics, in considerable series of cases, would furnish a very satisfactory indication of the comparative value of each.

TABLE I.

Length of time used.	Atropine.	Duboisine.	Hyoscyamine.	Homatropine.
6 hours or less...	0	No record.	..	28
8 " " ...	..	"	6	..
12 " " ...	1	"	..	..
1 day or less....	1	"	8	30
2 days or less...	9	23	24	26
3 " " ...	10	28	23	13
4 " " ...	7	11	15	6
5 " " ...	6	10	7	3
6 " " ...	6	4	1	..
7 " " ...	4	2	2	3
8 " " ...	1	..	1	1
9 " " ...	2	..	..	..
10 " " ...	..	..	..	1
11 " " ...	..	1	..	..
13 " " ...	1	..	..	..
14 " " ...	2	1	..	..
16 "	..	..	1	..
28 "	..	1	..	..
Total cases.....	50	81	88	111
Average time...	5¼ days.	3¼ days.	Less than 3 days.	31 hours.

Table I. has been constructed in this view: in it the atropine column is made up of fifty cases taken consecutively from the case-book, all of which were treated under atropine immediately before my observations with duboisine were begun. Accurate record was made of the length of use in 81 of the duboisine cases, in 88 of hyoscyamine, and in 111 where homatropine was employed.

It will be seen that, in point of time required for treatment, atropine is at a great disadvantage as compared with the newer drugs, since it required an average time of five and one-fourth days before the glasses were ordered, as against three and one-fourth days for duboisine, less than three days for hyoscyamine, and only thirty-one hours for homatropine. It is but fair to state, however, that the average time, as set forth in this table, in the case of atropine, is too high for healthy eyes or for those presenting but slight irritability. For, if we exclude from the table the cases in which the use of the drops was prolonged for many days, because of the severity of the choroido-retinal disturbance, and make due allowance for cases living out of the city, where an earlier visit would have shortened the period of use, it will be seen that the average time, in comparatively healthy eyes, will fall below that given in the table. Again, in case of homatropine, some modification should be made; for in twenty-eight of the one hundred and eleven cases it was employed for six hours or less, to be immediately followed, in many cases, by one of the other mydriatics, usually atropine or duboisine, in order to verify the results reached under the homatropine. These cases occurred before complete confidence in its efficiency had been gained. Making these allowances, the result is that atropine was employed for an average of 4 days, duboisine for 3.4, hyoscyamine for 3, and homatropine for 1.8.

A further study of the tabular statement serves still further to demonstrate the superiority of either of the new mydriatics in this respect. Thus, in the atropine column it is shown that in only twenty-two per cent. of the cases were the drops stopped inside of *three* days. Under duboisine, however, three days have proved sufficient in sixty-three per cent. of the cases. With hyoscyamine and homatropine the advantage is still more manifest; with the former sixty-nine per cent., and with the latter seventy-four per cent., used the drops three days or less.

I am aware that the method of using the mydriatics set forth in the above statements does not accord with the practice of many ophthalmic surgeons; but, for the discussion as to its necessity and merits,

I must refer to the article on "The Relative Value of the Sulphates of Atropine and Duboisine" (*American Journal Medical Science*, April, 1880). It is sufficient to state here that in my experience a single instillation or a few hours' use of a four-grain solution of atropine (and stronger solutions seem in no wise superior) has often not been sufficient to thoroughly set aside the accommodation, even in healthy eyes. Continued use is therefore necessary, and, when used in the manner and for the purpose above indicated, it would seem that any one of the newer mydriatics is to be preferred to atropine, as regards the time of instillation required in the treatment of asthenopic eyes. Nor is this the only portion of the treatment which is greatly shortened by the new drugs, for they possess another property which adds to their superiority.

In the preceding table and remarks, attention has been given to that stage only which is marked by the instillation of the drops; that is, from the first use until the refraction has been determined and the mydriatic discontinued. It is extremely desirable when this, the objective point in the conduct of the case, has been attained, that the further annoyance from the mydriasis and the paralysis of accommodation shall be as brief as possible. The weary waiting for the return of the eyes to the normal in these respects, is a trial to the equanimity of the patient, and a cause of great inconvenience many times to the surgeon.

It is in this respect that the newer mydriatics present their strongest claim for preference, since they resign their control so much sooner than atropine. After the use of the atropine to the complete setting aside of the accommodation about a full week must elapse, even in young persons, before the ability to read is regained, and in most cases from ten days to two weeks (sometimes even more) is required before there is a complete recovery from its influence. With duboisine or hyoscyamine, however, the duration is quite different. The ability to read is regained in from three to four days, and on the fourth or fifth day the recovery is complete.

With homatropine the time is still shorter. Its influence begins to diminish about two hours after the last instillation, and in twenty-four or thirty hours has entirely vanished. Some patients are able to read moderately large print within six hours after the last use of the drops. The duration of the paralysis added to the average time the drops were instilled will give approximately the average duration of the treatment, or the time the patient has been debarred from reading, writing, and all near work requiring accurate vision. The

following table gives opportunity for a ready contrast, and sets forth very accurately the results of daily experience in the use of these drugs in the treatment of refraction errors:

TABLE II.

Mydriatic used.	Time required.	Duration of Paralysis.	Total Duration of Treatment.
Atropine	4 days.	10 to 14 days.	14 to 17 days.
Duboisine	3.4 days.	4 days.	7.4 days.
Hyoscyamine	3 days.	4+ days.	7+ days.
Homatropine	1.8 days.	1 day.	2.8 days.

That the new mydriatics are a great advantage both to patient and physician as time-savers is thus vividly portrayed. The most favorable showing that is possible for atropine would drop the total duration to about ten days, even after its use for a few hours, as is the habit of many surgeons, and the difference of time in favor of duboisine or hyoscyamine would still be a gain of quite one-half. If careful comparison should prove them to be equally reliable as agents to paralyze the accommodation, a strong case would be made out in favor of the new mydriatics—so strong, indeed, as to quite displace the atropine so far as it is used for the purpose to which this paper is devoted.

In order to secure opportunity for such comparison with atropine and with each other, all of the cases in which more than one of the group had been employed were collated, arranged in groups, and the respective results carefully compared. The following tables contain a brief statement of each case, giving the formula of the correcting-glasses selected under the use of each mydriatic employed in the case. It is believed that they furnish ample proof of the efficiency of these drugs for the accomplishment of the purpose in view.

The reliability of duboisine has been already too clearly established to stand in need of further evidence. Nevertheless, in Table III., page 244, are collected from my case book the first sixteen cases which were found in which both atropine and duboisine had been in turn employed. In nine of these cases a careful correction had been made under atropine, and when after an interval of months or years a re-correction from some cause had seemed necessary, duboisine had been used. In six cases the duboisine correction had been revised

after varying intervals under atropine. In one, atropine had been used for a week immediately after the employment of duboisine for one hour. The results, set forth in detail in Table III., page 244, are further summarized in Table IX., page 254.

In Table IV., page 246, are recorded the results of 35 cases in which both homatropine and atropine were used. They fall naturally into four groups, A, B, C, and D. In 19 of these cases (Group A) the atropine was substituted for the homatropine without interval. In a number of these the use of the homatropine was purely experimental. It was instilled for a few hours, when a careful determination of the apparent error was made, but the ultimate correction took place under atropine. Such cases are generally indicated in the table by the short time the homatropine was used.

In Group B—Nos. 16 to 24 inclusive—the use of the atropine was experimental, the intention being that the correction should be made under the homatropine, and its accuracy tested by the atropine. These cases were, however, treated in dispensary practice, and the diminished sharpness of vision, as recorded, with the selected glasses, shows that the correction was not satisfactory—the disturbed condition of the interior of the eye, the want of care or intelligence upon the part of the patient, and the hurried determination under the pressure of the public clinic, all conspiring to prevent the greater accuracy secured in private practice. A third group—C, Nos. 30 to 32—comprises a few cases where, after an interval in which complete comfort had not been gained, a second determination of the refraction anomaly was made, with the employment of atropine to secure the prolonged paralysis of the ciliary muscle. The remaining cases—Group D—were those which had been corrected under atropine, at longer or shorter intervals previously, and, returning uncomfortable, were recorrected to prove or exclude errors in the former correction, or changes in the eyes since that determination. These last include a number of cases of progressive myopia, several of which had been proved such before by recorrection under atropine. In Groups A and B, among 38 eyes there was a distinct difference in 22 between the two determinations. In 16 of these the atropine revealed a higher hypermetropic or lower myopic refraction than was shown under the homatropine; but in 4 of these the latter had been used less than twenty-four hours, while the atropine had always the advantage of the rest secured by its predecessor. In 6 eyes, notwithstanding this advantage, the atropine failed to reveal as high H. or as low M. as the homatropine had done. In Group C, also,

the homatropine in 8 eyes showed higher H. or lower M. than was revealed previously by the atropine. It fell behind it, however, in 11 eyes, 9 of which were myopic, and by every optical test, and often by distinct pathological changes in the eye ground, were proven to have suffered an actual increase in the myopia. The other two were the subjects of distinct swelling of the nerve, with haziness of the retina, flashes of light, etc.—neuroretinitis, in short, at the time of the atropine correction. In each of the three cases composing Group D, the prolonged use of atropine revealed a slightly higher H. or lower M. than had been shown by the homatropine two or three months before. In paralyzing the accommodation, therefore, in 70 eyes, the homatropine appeared superior to the atropine in 14 instances, equal in 23, inferior in 22, while there were 11 more in which the difference was due to actual increase in the length of the visual axis. Remembering that, in 16 of the 22 eyes in which the homatropine seemed inferior, the use of the atropine followed without interval, and that in 22 others with the same sequence the latter confirmed its predecessor, we see that the showing for homatropine is excellent; for, even in those cases where the atropine showed a still lower refraction, the probability still remains that, had the homatropine been continued, the result would have been the same as that reached under the atropine.

Table V. page 249, gives the results of 19 cases in which homatropine and duboisine were used in turn. Grouping these cases as before, we find that there were (Groups A and B) 12 cases where the duboisine was substituted without interval; (C), 6 where the correction, once made under the duboisine, was gone over under homatropine after an interval varying from two months to two years; and (D) 1 case where the homatropine followed the other mydriatic without interval. In Groups A and B the results were at variance in 13 eyes, in 10 of which the advantage was on the side of duboisine, and in 3 in favor of homatropine. In Group C, 5 results were different, 1 counting for duboisine, 3 for homatropine, while 1 was due to progressive myopia. In the one case—No. 19 of the table—where the homatropine was used immediately after the duboisine, there was very marked choroido-retinal irritation and spasm of accommodation. These at first lessened under the duboisine, but began again to increase; under homatropine they disappeared, and a lower concave glass gave better vision than was obtainable under the other mydriatic.

Therefore, in 38 eyes, homatropine appeared to a disadvantage in 11, on an equality in 18, superior in 8; and there was one instance

where the change had to be ascribed to actual lengthening of the eyeball. In view of the fact that in 24 of these instances the duboisine was used in an eye already put at rest by the homatropine, while in but 2 was this sequence reversed, the showing is distinctly favorable to the homatropine.

In Table VI., page 252, are compared 15 cases in which both atropine and hyoscyamine were employed. In 9 of these (Groups A and B) the hyoscyamine was used, to be immediately followed by atropine. These again were dispensary cases, with the disadvantages noted under the same head in the remarks on Table III., page 244. (C) In a single case the atropine was employed after an interval of two weeks, the eyes remaining uncomfortable. (D) In five cases the atropine determination had been previously made, and after an interval of years the recorrection was undertaken under hyoscyamine. In Groups A and B there was variation in 9 eyes, 8 of these being in favor of atropine, 1 in favor of hyoscyamine. In Group D the hyoscyamine showed error in the atropine correction in three instances, while there were two of progressive myopia. In the one case under C—No. 4 of the table—there was great improvement of the condition of the eye-ground under hyoscyamine, and the choroido retinal irritation largely disappeared. The remaining trouble did not, however, decrease after the withdrawal of the mydriatic; and when after two weeks atropine was given, it was found necessary to use it steadily for three weeks before the eyes were quiet and comfortable. A slightly higher hypermetropic refraction was then found.

In 29 eyes, then, the hyoscyamine compared unfavorably with atropine in 10; was on an equality in 13; in 4 proved superior, while the other two variations were due to progressive myopia. In seventeen of these eyes the atropine mydriasis succeeded without interval that of the hyoscyamine.

Table VII., page 253, shows three cases in which, a former duboisine correction proving unsatisfactory, the determination was again made under hyoscyamine. In one of these cases the result was a verification of the duboisine correction; in the other two the hyoscyamine showed a lower myopic or a higher hypermetropic refraction. In five eyes, therefore, it equalled duboisine in one instance and surpassed it in four, as a paralysant of the accommodation.

Table VIII., page 254, shows two cases in which both homatropine and hyoscyamine were employed. In the first, homatropine was used two years after an atropine correction (*vide* No. 34, Table IV., page 249, and No. 15, Table VI., page 253), and an apparent

change toward myopia found. Not satisfied with this result, hyoscyamine was given a few months later, and a commencing myopia demonstrated in the right eye, while the apparent increase of myopia in the left was proven to be functional only, and the former atropine correction shown to have been slightly in error. In the second case, after two days' use of the homatropine, without interval, hyoscyamine was used for an hour and a quarter, and the result obtained under the first mydriatic confirmed.

Summarizing these results, then, and leaving out of consideration the cases of progressive myopia, we obtain the showing given in Table IX., page 254

Although these figures possess some value as showing the results of experience, they do not exhibit all the facts, and consequently do not furnish a complete basis for a comparison. They have served to demonstrate, not only that the newer mydriatics are efficient agents both for paralyzing the accommodation and allaying the retino-choroidal irritation ; but that the time required in the treatment of asthenopic eyes is much shorter than was formerly required under the use of atropine.

With these numerous efficient drugs at our disposal, it is proper to inquire whether they are equally valuable in all cases, so that one or the other may be indifferently employed. The ground for selection is usually the presence or absence of pathological changes in the eye-ground. If, for example, the retina and choroid are comparatively healthy, and there is but little tendency to accommodative spasm or cramp, homatropine should be chosen, since by its use the inconvenience to the patient growing out of the mydriasis and paralysis of accommodation is placed at the minimum. If, on the other hand, there is well-marked retinal irritation and choroidal disturbance, with the usually attending symptoms of photophobia and ciliary cramp, one of the other mydriatics is to be preferred. It has already been pointed out that an important object in employing a mydriatic is to secure the complete quiet of the ciliary muscle, since it is largely upon its effort to overcome the error of refraction that the asthenopia depends. In cases of this character the necessity for prolonged paralysis frequently presents itself, and in order to secure constant and prolonged rest of the accommodation, one of the more persistent mydriatics should be selected. It will be seen, therefore, that the property which most commends the homatropine in comparison with the other members of the group, viz., its evanescent control over the accommodation and iris, detracts from its util-

ity when employed in severe cases of asthenopia. A careful study of the returning accommodation after the use of the respective mydriatics has revealed certain peculiarities which are important as aiding in their selection. After the use of atropine the maximum effect is gained and immediately declines, the return of the accommodative function being gradual and constant until the original near point is recovered. This, however, is followed by several days of weakness, so that the near point can be maintained for only a short time. This period of weakness after recovery of the near point is common to all members of the group, but is more noticeable after atropine. The returning function after paralysis by homatropine is also constant and gradual within the time required—about twenty-four hours.

The case is, however, different after paralysis with hyoscyamine. Although the time required for the full re-establishment of the function of accommodation is much shorter (less than one-half that required by atropine), nevertheless the duration of the absolute paralysis is much greater. The maximum impression, having been reached, is apparently maintained for many hours. In my own eye, after twenty-four hours, there was only the slightest indication of any returning accommodation. With duboisine, observation on this point is wanting. If subsequent investigation should confirm the above observation, it will furnish theoretical grounds for the fact which the preceding clinical studies have seemed to demonstrate, viz., that the hyoscyamine is superior to atropine, in that the time required for its use in allaying the choroidal disturbance falls far below that required by atropine in the same class of cases. It may be that the explanation is found in the more prolonged and firmer grasp in which it holds the ciliary muscle.

It would seem, therefore, that in the treatment of severe cases of asthenopia, where prolonged and perfect rest of the ciliary muscle is desirable, that hyoscyamine, and possibly duboisine, are to be preferred to homatropine, or even to atropine, notwithstanding the comparatively long time the latter holds the accommodation in abeyance or partial control. In cases, however, where the necessity for prolonged rest of the accommodation is not presented, advantage should be taken of the rapid decline of the paralysis and mydriasis following the use of homatropine.

Furthermore, the homatropine holds out the additional advantage of almost entire immunity from unpleasant constitutional disturbance. In the atropine and duboisine paper it was pointed out that

four-grain solutions of the sulphate of duboisine could not be safely employed; but that in solutions not stronger than gr. ij. to f. ʒ j., it could be used with safety, and that, too, with less frequent annoyance from constitutional disturbance than was produced by the *four-grain* solution of the sulphate of atropine. Nevertheless, even the two grain solution occasionally gave rise to the general disturbance, *i.e.*, hurried pulse, giddiness, and a sense of weakness in the lower extremities. In two cases attacks of biliary derangement, with marked prostration, came on during the protracted instillation of the duboisine, and seemed to depend upon its use, although it at first caused none of the usual constitutional impressions. No such experiences have thus far been had with the hyoscyamine, which has invariably been used in a solution of grains ij. to f. ʒ j. three times daily. In a few cases, however, it was also attended with well-marked general symptoms, which in many respects were similar to the effect produced by the duboisine, but was not marked by the weakness in the lower extremities, nor by the prostration which characterized, in a measure, the poisoning by the duboisine. The employment of hyoscyamine, therefore, has, on the whole, been more satisfactory than that of duboisine. In one instance the retinal irritation increased under the duboisine, but rapidly subsided under homatropine—a fact which would seem to indicate that there is some room for choice in selecting the member of the group to be employed in *individual cases.*

With homatropine the possibility of constitutional derangement is so remote as to place it beyond serious consideration. The experience in its use, as set forth in this paper, has been almost invariably with a solution of the hydrobromate of homatropine, gr. vi. to f. ʒ j. The method of employment has differed widely from that in the case of atropine, duboisine, or hyoscyamine.

Two drops of the above solution were instilled, at home, every three hours. At the office, prior to the final determination of the refraction, the drops were used every fifteen minutes, and in an hour to an hour and a half the measurement was undertaken. In only one case was there any constitutional annoyance at all comparable to the symptoms so frequently produced by the atropine solution, and less frequently by the duboisine and hyoscyamine. In this exceptional case, by a misunderstanding, the six-grain solution was continued at home every two hours, after repeated instillations in the office.

The repeated instillations, and careful oversight of the case, which

are necessary to secure a perfect paralysis of the ciliary muscle by homatropine, furnish a great drawback to its employment, because of the attendant inconvenience. The prolonged detention leads to undue crowding of the consultation-rooms, and, in order to complete the measurement for glasses, not infrequently necessitates detention beyond the hours allotted for consultation.

The solutions in distilled water have proved efficient and more satisfactory than other preparations. The readiness with which the solutions were carried away with the tears into the nose, and thence to the stomach, seemed to be the source of the constitutional impression. In order to avoid this, other menstrua were tried, but abandoned. Gelatine wafers were efficient, but seemed to possess no advantages over the solutions in water, and were less convenient. In the treatment of inflammations of the conjunctiva or cornea, the incorporation of the drugs with cosmoline or vaseline furnishes an excellent method of administration, but does not answer for their employment in correcting refraction errors. The unctuous material is retained in the conjunctival sac for a long time, and forms a thin film over the surface of the cornea, marring its transparency, and thus effectually preventing, for the time-being, any successful effort at correction of the error of refraction.

Conjunctival irritation not infrequently resulted from the protracted employment of the solutions, but only in minor degrees, and was not a sufficient source of annoyance to claim more than a passing notice.

Where any complaint was made of the drops smarting, a single application of the alum-crystal was sufficient to remove the annoyance. A single notable exception to this is detailed in the paper on "The Relative Value of the Sulphates of Atropine and Duboisine," before cited.

In that case both atropine and duboisine caused severe irritation. This had occurred in other cases, in my earlier experience, where sulphate of atropia was used, but in every instance the solution was shown to be acid in its reaction, and the trouble disappeared under the use of a neutral solution.

In no instance was there any noticeable increase of the tension of the eyeball, even after protracted use. In a few instances the duboisine was discontinued, because of an evident increase in the chorioido-retinal irritation, which depended apparently upon its use. In each case homatropine was substituted, with the effect of relieving the irritation and increased sensitiveness to light.

These cases, however, suffered very much from the constitutional effect of the duboisine.

From the foregoing the following conclusions seem justifiable:

First.—That the sulphates of atropine, duboisine, and hyoscyamine, and the hydrobromate of homatropine, are efficient agents for paralyzing the accommodative function, and in the treatment of asthenopic eyes.

Second.—That, in the employment of the last three named, the duration of the treatment is very much shortened.

Third.—That, for the correction of anomalies of refraction, in otherwise normal eyes, the homatropine is to be preferred.

Fourth.—That, if retino-choroidal disturbance is also present, hyoscyamine or duboisine are preferable: (*a*) to atropine, because of the shorter duration of the treatment; (*b*) to homatropine, because of their more persistent control over the ciliary muscle.

Fifth.—That hyoscyamine is preferable to duboisine, since the tendency to systemic poisoning is not so great.

In closing this paper, I desire to express my great indebtedness to Dr. B. Alexander Randall for his untiring aid in its preparation.

NOTE.—It will be proper to state that the preparations of hyoscyamine which have of late been furnished me, have seemed more persistent in their control of the accommodation than those first employed. In a few instances this has been so markedly the case as to justify the suspicion that atropine had been used to substitute or adulterate the hyoscyamine.

TABLE III.—A COMPARISON OF DUBOISINE AND ATROPINE IN THE SAME CASES.

No.	Age.	Duboisine used.	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
1	11	12 days.	O. D. + $\frac{1}{24}$ c. ax. 105	20/XXX	4 days.	O. D. + $\frac{1}{24}$ c. ax. 105	20/XXX ?	Duboisine 8 mos. subsequent to atropine.
			O. S. + $\frac{1}{16}$ c. ax. 90	20/XXX		O. S. + $\frac{1}{16}$ c. ax. 90	20/XXX ?	
2	11	7 "	O. D. + $\frac{1}{48}$ s. ⊃ − $\frac{1}{10}$ c. ax. 15 ..	20/XX	26 "	O. D. + $\frac{1}{48}$ (or $\frac{1}{60}$ s.) ⊃ + $\frac{1}{10}$ c. ax. 15°	20/XX ?	Myopia steadily progressive. Numerous corrections between. Atropine 5 and 8 mos. subsequent to duboisine.
			O. S. − $\frac{1}{12}$ c. ax. 180	20/XX	12 "	O. S. − $\frac{1}{12}$ c. ax. 180	20/XX ?	
3	30	3 "	O. D. + $\frac{1}{48}$ s. ⊃ − $\frac{1}{10}$ c. ax. 15 ..	20/XX	5 "	O. D. − $\frac{1}{60}$ s. ⊃ − $\frac{1}{20}$ c. ax. 15	20/XXX	Duboisine 18 mos. subsequent to atropine.
			O. S. − $\frac{1}{48}$ s. ⊃ − $\frac{1}{30}$ c. ax. 10 ..	20/XX		O. S. − $\frac{1}{60}$ ⊃ − $\frac{1}{30}$ c. ax. 15°	20/XXX	Progressive myopia (?).
4	14	5 "	O. D. + $\frac{1}{60}$ c. ax. 135°	20/XX	14 "	O. D. + $\frac{1}{72}$ s. ⊃ + $\frac{1}{10}$ c. ax. 135° ...	20/XX	Marked choroido-retinal irritation.
			O. S. + $\frac{1}{10}$ c. ax. 45°	20/XX		O. S. + $\frac{1}{72}$ s. ⊃ − $\frac{1}{60}$ c. ax. 45°	20/XX	Atropine 9 mos. after duboisine.
5	24	3 "	O. D. − $\frac{1}{30}$ s.	20/XX	4 "	O. D. − $\frac{1}{72}$ s.	20/XVI	Progressive myopia; high insuf. intern.
			O. S. − $\frac{1}{12}$ s. ⊃ − $\frac{1}{12}$ c. ax. 30 ..	20/XX		O. S. − $\frac{1}{72}$ s.	20/XVI	Duboisine 4 yrs. after atropine.
6	34	1 day.	O. D. − $\frac{1}{30}$ s. ⊃ − $\frac{1}{12}$ c. ax. 20°..	20/XX	7 "	O. D. − $\frac{1}{36}$ s. ⊃ − $\frac{1}{60}$ c. ax. 15	20/XX	Duboisine 18 mos. after atropine.
			O. S. − $\frac{1}{30}$ s. ⊃ − $\frac{1}{30}$ c. ax. 180° .	20/XX		O. S. − $\frac{1}{24}$ s. ⊃ − $\frac{1}{48}$ c. ax. 180 ...	20/XX	
7	19	2 days.	O. D. + $\frac{1}{18}$ s. (or + $\frac{1}{10}$ s.) ⊃ + $\frac{1}{30}$ c. ax. 75	20/XX	4 "	O. D. + $\frac{1}{18}$ s. ⊃ + $\frac{1}{36}$ c. ax. 75°	20/XXX ?	Duboisine 2 yrs. after atropine.
			O. S. + $\frac{1}{12}$ s. ⊃ + $\frac{1}{12}$ c. ax. 75 ..	20/XX ?		O. S. + $\frac{1}{48}$ s. ⊃ + $\frac{1}{30}$ c. ax. 75	20/XXX?	
8	20	1 day.	O. D. + $\frac{1}{36}$ s. ⊃ − $\frac{1}{9}$ c. ax. 180 .	20/XI ? ?	.....	O. D. + $\frac{1}{36}$ c. ax. 90 ⌊ ⊃ − $\frac{1}{10}$ c. ax. 180°	10/XX ?	Duboisine 3 yrs. after atropine.
			O. S. − $\frac{1}{72}$ s. ⊃ − $\frac{1}{24}$ c. ax. 180° .	20/XX ?	.....	O. S. − $\frac{1}{72}$ s. ⊃ − $\frac{1}{24}$ c. ax. 180 ...	10/XII ?	

9	35	4 days.	O. D. $-\frac{1}{6.5}$ s. ⊃ $-\frac{1}{7.5}$ c. ax. 30°	$\frac{20}{XL}$?	20 days.	O. D. $-\frac{1}{6.5}$ s. or $-\frac{1}{7}$ s.	$\frac{20}{XXX}$??	Progressive myopia.
			O. S. $-\frac{1}{6.5}$ s. ⊃ $-\frac{1}{7.5}$ c. ax. 15°	$\frac{20}{XL}$?		O. S. $-\frac{1}{6.5}$ s. ⊃ $-\frac{1}{7.5}$ c. ax. 15°	$\frac{20}{XXX}$?	Atropine 6 mos. after duboisine.
10	13	1 hour.	O. D. $+\frac{1}{36}$ s.	$\frac{20}{XXX}$	7	O. D. $+\frac{1}{36}$ s.	....	Atropine substituted without interval.
			O. S. $+\frac{1}{36}$ s.	$\frac{20}{XXX}$		O. S. $+\frac{1}{36}$ s.	....	
11	29	7 days.	O. D. $-\frac{1}{15}$ s. ⊃ $-\frac{1}{60}$ c. ax. 105°	$\frac{20}{XXX}$	4	O. D. $-\frac{1}{15}$ s. (⊃ $-\frac{1}{15}$ c. ax. 90° ?).	$\frac{20}{XXX}$	Duboisine 14 mos. after atropine.
			O. S. $-\frac{1}{14}$ s. ⊃ $-\frac{1}{60}$ c. ax. 75°	$\frac{20}{XXX}$		O. S. $-\frac{1}{5}$ s.	$\frac{20}{XXX}$	
12	25	7 "	O. D. $-\frac{1}{12}$ s.	$\frac{20}{XX}$	5	O. D. $-\frac{1}{12}$ s.	$\frac{20}{XX}$	Atropine 14 mos. after duboisine.
			O. S. $-\frac{1}{15}$ s. ⊃ $-\frac{1}{12}$ c. ax. 30°	$\frac{20}{XX}$		O. S. $-\frac{1}{16}$ s. ⊃ $-\frac{1}{12}$ c. ax. 30°	$\frac{20}{XX}$	
13	25	2 "	O. D. $-\frac{1}{12}$ c. ax. 60°	$\frac{20}{XX}$	27	O. D. Em.	X	Insufficiency of interni.
			O. S. $-\frac{1}{12}$ c. ax. 90°	$\frac{20}{XX}$		O. S. Em.	X	Duboisine 2½ yrs. after atropine.
14	20	11 "	O. D. $-\frac{1}{45}$ s.	$\frac{20}{XX}$	7	O. D. $-\frac{1}{45}$ s.	$\frac{20}{XX}$	Duboisine 15 mos. after atropine.
			O. S. $-\frac{1}{60}$ s. or $-\frac{1}{72}$ s.	$\frac{20}{XX}$		O. S. $-\frac{1}{60}$ s.	$\frac{20}{XX}$	
15	22	3 "	O. D. $+\frac{1}{48}$ s. ○ $+\frac{1}{72}$ c. ax. 90°	$\frac{20}{XX}$	7	O. D. $+\frac{1}{48}$ s. ⊃ $+\frac{1}{48}$ c. ax. 100°	...	Atropine 1 year after duboisine.
			O. S. $+\frac{1}{48}$ s. ○ $+\frac{1}{60}$ c. ax. 90°	$\frac{20}{XX}$		O. S. $+\frac{1}{48}$ s. ⊃ $+\frac{1}{60}$ c. ax. 80°	...	
16	7½	4 "	O. D. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{60}$ c. ax. 90°	$\frac{20}{XXX}$?	7	O. D. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90°	$\frac{20}{XXX}$	Atropine 2 yrs. after duboisine.
			O. S. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90°	$\frac{20}{XXX}$?		O. S. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{60}$ c. ax. 90°	$\frac{20}{XXX}$	

TABLE IV.—A COMPARISON OF HOMATROPINE AND ATROPINE IN THE SAME CASES.

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
1	22	48 hours.	O. D.—$\frac{1}{6}$ s. or —$\frac{1}{12}$ s.	20/XX	2 days.	O. D.—$\frac{1}{12}$ s.	20/XX	Atropine immediately following.
			O. S.—$\frac{1}{100}$ s.	20/XX		O. S.—$\frac{1}{12}$ s.	20/XX	Spasm of accom.
2	47	20 "	O. D. + $\frac{1}{8}$ s. ⊃ + $\frac{1}{4}$ c. ax. 90° ...	20/XXV ?	5 "	O. D. + $\frac{1}{8}$ s. ⊃ + $\frac{1}{4}$ c. ax. 90	20/XX ?	Neuro-retinitis. Atrop. correction 2½ years previous.
			O. S. + $\frac{1}{8}$ s.	....		O. S. + $\frac{1}{8}$ s.	20/XX ?	
3	41	6 "	O. D.—$\frac{1}{10}$ c. ax. 60	20/XXV	2 "	O. D.—$\frac{1}{10}$ c. ax. 60	20/XXV +	Atrop. immediately after hom.
			O. S.—$\frac{1}{4}$ c. ax. 120°	20/XX		O. S.—$\frac{1}{4}$ c. ax. 120	20/XX	
4	28	1½ hour.	O. D. + $\frac{1}{24}$ s. ⊃ + $\frac{1}{12}$ c. ax. 75 ..	20/I	3 "	O. D. + $\frac{1}{10}$ s. ⊃ + $\frac{1}{12}$ c. ax. 60	20/XXX +	Marked chor. ret. irritation.
			O. S. + $\frac{1}{20}$ s. ⊃ + $\frac{1}{10}$ c. ax. 120 .	20/XI ?		O. S. + $\frac{1}{10}$ s. ⊃ + $\frac{1}{24}$ c. ax. 120 ...	20/XI +	Atr. immediately after hom.
5	20	1 "	O. D.—$\frac{1}{12}$ s. ○ —$\frac{1}{20}$ c. ax. 90° ..	20/XX	3 "	O. D.—$\frac{1}{12}$ s. ⊃ —$\frac{1}{12}$ c. ax. 105 ...	20/XX	Progressive myopia. Atrop. correction 3 years previous.
			O. S.—$\frac{1}{12}$ s. ○—$\frac{1}{12}$ c. ax. 90° ..	20/XX		O. S.—$\frac{1}{12}$ s. ⊃ —$\frac{1}{12}$ c. ax. 75	20/XX	
6	22	96 hours.	O. D.—$\frac{1}{8}$ s. ○—$\frac{1}{20}$ c. ax. 170° ..	20/XX	4 "	O. D.—$\frac{1}{8}$ s. ⊃ —$\frac{1}{48}$ c. ax. 165	20/XX ?	Progressive myopia. Atrop. correction 3½ years previous.
			O. S.—$\frac{1}{12}$ s. ○—$\frac{1}{12}$ c. ax. 40° ..	20/XX		O. S.—$\frac{1}{12}$ s. ⊃ —$\frac{1}{12}$ c. ax. 35	20/XX ?	
7	54	9 days.	O. D. + $\frac{1}{60}$ s.	20/XX	3 "	O. D. + $\frac{1}{48}$ s.	20/XX	Marked hyperæsthesia ret.
			O. S. + $\frac{1}{48}$ s.	20/XX		O. S. + $\frac{1}{12}$ s. ⊃ + $\frac{1}{12}$ c. ax. 90°	20/XX	Atr. immediately after hom.
8	26	24 hours.	O. D. (+ $\frac{1}{12}$?) ⊃ —$\frac{1}{24}$ c. ax. 120	20/XX ?	1 day.	O. D. + $\frac{1}{12}$ s. ○—$\frac{1}{24}$ c. ax. 120 ...	20/XX +	Atr. immediately after hom.
			O. S.—$\frac{1}{12}$ s or —$\frac{1}{20}$ s. ⊃ —$\frac{1}{20}$ c. ax. 60	20/I		O. S. —$\frac{1}{12}$ s. ⊃—$\frac{1}{24}$ c. ax. 60°	20/XI ?	
9	38	72 "	O. D.—$\frac{1}{4}$ s. ⊃ —$\frac{1}{24}$ c. ax. 180° ..	20/XXV ?	2 days.	O. D.—$\frac{1}{8}$ ⊃ —$\frac{1}{24}$ c. ax. 180	20/XXV	Progressive myopia.
			O. S.—$\frac{1}{12}$ s. ⊃ —$\frac{1}{10}$ c. ax. 25 ..	20/XXV ?		O. S.—$\frac{1}{12}$ ⊃ —$\frac{1}{12}$ c. ax. 25	20/XXV ?	Atr. immediately after hom.

10	1	8	48 hours.	O. D. + $\frac{1}{4}$ c. ax. 105	$\frac{1}{xx}$	Marked ret. irritation. Atr immediately after hom. Atr. corr. 4 yrs. before. + $\frac{1}{4}$ c. ax. 75.
				O. S. + $\frac{1}{10}$ s. ⊃ + $\frac{1}{2}$ c. ax. 75 ..	$\frac{1}{xx}$	
11	19	48	"	O. D. − $\frac{1}{12}$ s. ⊃ − $\frac{1}{10}$ c. ax. 15 .	$\frac{1}{xx}$	Atr. immediately after hom.
				O. S. − $\frac{1}{10}$ s. ⊃ − $\frac{1}{12}$ c. ax. 15 ..	$\frac{1}{xxi}$	Marked ret. irritation.
12	21	48	"	O. D. + $\frac{1}{12}$ s. ⊃ + $\frac{1}{10}$ c. ax. 105 .	$\frac{1}{xx}$	Atr. substituted to subdue remaining ret. irritation.
				O. S. + $\frac{1}{12}$ s. ⊃ + $\frac{1}{10}$ c. ax. 90 ..	$\frac{1}{xx}$	
13	7	3	"	O. D. + $\frac{1}{4}$ s. ⊃ + $\frac{1}{2}$ c. ax. 75 ..	$\frac{1}{1}$	Alternating strabismus and amblyopia. V. later O. D. $\frac{1}{xxx}$??.
				O. S. + $\frac{1}{4}$ s. ⊃ + $\frac{1}{4}$ c. ax. 105	$\frac{1}{xxx}$ +	
14	18	24	"	O. D. + $\frac{1}{12}$ s.	$\frac{1}{xx}$	Atr. correction by another previously. Dubois, later.
				O. S. + $\frac{1}{12}$ s.	$\frac{1}{xx}$	
15	45	7 days.		O. D. + $\frac{1}{14}$ s.	$\frac{1}{xx}$?	Neuro-retinitis. Atr. immediately after hom. Again later.
				O. S. + $\frac{1}{14}$ s.	$\frac{1}{xx}$?	
16	23	72 hours.		O. D. + $\frac{1}{8}$ s. ⊃ + $\frac{1}{10}$ c. ax. 45 ..	$\frac{1}{xxx}$	Atr. immediately after hom.
				O. S. + $\frac{1}{10}$ s. ⊃ + $\frac{1}{10}$ c. ax. 165 .	$\frac{1}{xxi}$	
17	26	48	"	O. D. Em.	...	Atr. immediately after hom.
				O. S. − $\frac{1}{12}$ s. ⊃ − $\frac{1}{10}$ c. ax. 45 ..	...	
18	28	48	"	O. D. + $\frac{1}{10}$ c. ax. 90	$\frac{1}{xxi}$	Atr. immediately after hom.
				O. S. + $\frac{1}{10}$ c. ax. 105	$\frac{1}{xxi}$	
19	14	72	"	O. D. − $\frac{1}{4}$ s. ⊃ − $\frac{1}{4}$ c. ax. 180 ..	$\frac{1}{xxx}$	Atr. immediately after hom.
				O. S. − $\frac{1}{10}$ s.	$\frac{1}{xxx}$	
20	20	48	"	O. D. + $\frac{1}{12}$ s.	$\frac{1}{xxi}$	Atr. immediately after hom.
				O. S. + $\frac{1}{12}$ s.	$\frac{1}{xxi}$	
12	"			O. D. + $\frac{1}{10}$ s. cor + $\frac{1}{12}$ s. ⊃ + $\frac{1}{10}$ c. ax. 90	$\frac{1}{xx}$	
				O. S. + $\frac{1}{12}$ s. cor + $\frac{1}{12}$ s. ⊃ + $\frac{1}{12}$ c. ax. 75	$\frac{1}{xx}$	
3	"			O. D. − $\frac{1}{12}$ c. ax. 10	$\frac{1}{xx}$	Atr. immediately after hom.
				O. S. − $\frac{1}{12}$ s. ⊃ − $\frac{1}{12}$ c. ax. 15	$\frac{1}{xx}$	Marked ret. irritation.
2	"			O. D. + $\frac{1}{12}$ s. ⊃ + $\frac{1}{10}$ c. ax. 105 ...	...	Atr. substituted to subdue remaining ret. irritation.
				O. S. + $\frac{1}{12}$ s. ⊃ + $\frac{1}{10}$ c. ax. 90	...	
7	"			O. D. + $\frac{1}{4}$ s. ⊃ + $\frac{1}{2}$ c. ax. 75	$\frac{1}{1}$	Alternating strabismus and amblyopia. V. later O. D. $\frac{1}{xxx}$??.
				O. S. + $\frac{1}{4}$ s. ⊃ + $\frac{1}{4}$ c. ax. 105 ...	$\frac{1}{xxx}$?	
....				O. D. + $\frac{1}{10}$ s.	...	Atr. correction by another previously. Dubois, later.
				O. S. + $\frac{1}{10}$ s.	...	
2	"			O. D. + $\frac{1}{14}$ s.	$\frac{1}{xx}$ +	Neuro-retinitis. Atr. immediately after hom. Again later.
20	"			O. S. + $\frac{1}{4}$ s. ⊃ + $\frac{1}{2}$ c. ax. 75	$\frac{1}{xx}$ +	
1	day.			O. D. + $\frac{1}{8}$ s. ⊃ + $\frac{1}{10}$ c. ax. 45	$\frac{1}{xxx}$?	Atr. immediately after hom.
				O. S. + $\frac{1}{14}$ ⊃ + $\frac{1}{10}$ c. ax. 165	$\frac{1}{xxi}$	
1	"			O. D. Em.	...	Atr. immediately after hom.
				O. S. − $\frac{1}{12}$ s. ⊃ − $\frac{1}{12}$ c. ax. 45	...	
1	"			O. D. + $\frac{1}{10}$ c. ax. 85	$\frac{1}{xxi}$	Atr. immediately after hom.
				O. S. + $\frac{1}{10}$ c. ax. 100	$\frac{1}{xxi}$	
3	days.			O. D. − $\frac{1}{8}$ s. ⊃ − $\frac{1}{14}$ c. ax. 180	$\frac{1}{xx}$	Atr. immediately after hom.
				O. S. − $\frac{1}{10}$ s.	$\frac{1}{xx}$	
1	day.			O. D. + $\frac{1}{12}$ s.	$\frac{1}{xxi}$	Atr. immediately after hom.
				O. S. + $\frac{1}{14}$ s.	$\frac{1}{xxi}$	

TABLE IV.—A COMPARISON OF HOMATROPINE AND ATROPINE IN THE SAME CASES.—*Continued.*

No.	Age	Homatropine used	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
21	13	48 hours.	O. D. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{24}$ c. ax. 90 ..	$\frac{15}{XX}$	5 days.	O. D. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90	$\frac{15}{XVI}$	Atr. immediately after hom.
			O. S. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90 ..	$\frac{15}{XX}$		O. S. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{60}$ c. ax. 90	$\frac{15}{XVI}$	
22	20	48 "	O. D. $+\frac{1}{60}$ s.....	...	2 "	O. D. $+\frac{1}{120}$ s.....	...	Atr. immediately after hom.
			O. S. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{24}$ c. ax. 120 .	...		O. S. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{60}$ c. ax. 120	...	
23	37	72 "	O. D. $+\frac{1}{24}$ s.....	$\frac{15}{XX}$	1 day.	O. D. $+\frac{1}{240}$ s.....	$\frac{15}{XVI}$	Atr. immediately after hom.
			O. S. $+\frac{1}{24}$ s.....	$\frac{15}{XX}$		O. S. $+\frac{1}{240}$ s.....	$\frac{15}{XVI}$	
24	20	48 "	O. D. $+\frac{1}{36}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90 ..	$\frac{15}{XVI}$?	1 "	O. D. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90	$\frac{15}{XVI}$?	Atr. immediately after hom.
			O. S. $+\frac{1}{48}$ s. ⊃ $+\frac{1}{60}$ c. ax. 75 ..	$\frac{15}{XVI}$		O. S. $+\frac{1}{48}$ s. ⊃ $+\frac{1}{48}$ c. ax. 75	$\frac{15}{XVI}$?	
25	33	26 "	O. D. $-\frac{1}{12}$ c. ax. 165°	$\frac{20}{XX}$	3 days.	O. D. Em	$\frac{20}{XX}$	Atr. correction 2½ yrs. before.
			O. S. $-\frac{1}{36}$ c. ax. 75	$\frac{20}{XX}$?		O. S. $-\frac{1}{60}$ c. ax. 75°	$\frac{20}{XX}$	Ret. irritation and insuf. of Int.
26	19	24 "	O. D. $-\frac{1}{12}$ s. ⊃ $+\frac{1}{36}$ c. ax. 90° .	$\frac{20}{XX}$ +	2 "	O. D. $+\frac{1}{48}$ c. ax. 90	$\frac{20}{XX}$	Atr. correction 2 yrs. previous.
			O. S. $-\frac{1}{12}$ s.....	$\frac{20}{XX}$		O. S. $+\frac{1}{60}$ c. ax. 60	$\frac{20}{XX}$	Commencing myopia O. S.
27	37	2½ "	O. D. $-\frac{1}{36}$ c. ax 90	$\frac{20}{XX}$?	2 "	O. D. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{60}$ c. ax. 60	$\frac{20}{XX}$	Atr. correction 1 yr. previous.
			O. S. $+\frac{1}{4}$ c. ax. 120 ⌊ ⊃ $-\frac{1}{12}$ c. ax. 30	$\frac{20}{XX}$?		O. S. $+\frac{1}{36}$ c. ax. 120°	$\frac{20}{XX}$	Commencing myopia O. S.
28	14	18 "	O. D. $+\frac{1}{12}$ s. ⊖ $+\frac{1}{12}$ c. (or $+\frac{1}{4}$ c.) ax. 75	$\frac{20}{XXX}$ +	3 "	O. D. $+\frac{1}{36}$ s. ⊃ $+\frac{1}{48}$ c. ax. 75°	$\frac{20}{64}$	Atr. correction 1 yr. before.
			O. S. $+\frac{1}{36}$ s ⊃ $+\frac{1}{24}$ c. ax. 105	$\frac{20}{XXX}$ +		O. S. $+\frac{1}{36}$ s. ⊃ $+\frac{1}{24}$ c. ax. 105 ..	$\frac{20}{32}$ +	Marked improvement in V. O. D.
29	35	3 "	O. D. $+\frac{1}{60}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90° .	$\frac{20}{XX}$	15 hours.	O. D. $+\frac{1}{60}$ s. ⊖ $+\frac{1}{60}$ c. ax. 90	$\frac{20}{VIII}$?	Atr. correction 4 yrs. before.
			O. S. $+\frac{1}{60}$ s. ⊃ $+\frac{1}{48}$ c. ax. 90° ..	$\frac{20}{XX}$		O. S. $+\frac{1}{60}$ s. ⊖ $+\frac{1}{60}$ c. ax. 90 ...	$\frac{20}{VIII}$?	

30	26	20 days.	O. D. $-\frac{1}{2}$ s.	20/XX	8 days.	O. D. $+\frac{1}{40}$ s.	20/XX	Neuro-retinitis (?).
			O. S. $+\frac{1}{40}$ s. or $+\frac{1}{2}$ s.	20/XX		O. S. $+\frac{1}{40}$ s.	20/XX	Atr. correction 3 mos. later.
31	12	18 hours.	O. D. $+\frac{1}{4}$ s.	20/XX	4 "	O. D. $+\frac{1}{24}$ s. ($+\frac{1}{12}$ s.?)	20/XXI ?	Atr. correction 3 mos. later.
			O. S. $-\frac{1}{10}$ s.	20/XX		O. S. $-\frac{1}{10}$ s. or $-\frac{1}{20}$ s.	20/XX	
32	12	120 "	O. D. $+\frac{1}{20}$ s.	20/XXI ?	5 "	O. D. $+\frac{1}{24}$ s.	20/— ?	Atr. correction 2 mos. later.
			O. S. $+\frac{1}{24}$ s.	20/XXI		O. S. $+\frac{1}{24}$ s.	20/... ?	
33	9	72 "	O. D. $+\frac{1}{2}$ s. ⊃ $+\frac{1}{24}$ c. ax. 30 ..	20/XI ?	3 "	O. D. $+\frac{1}{4}$ s. ⊃ $+\frac{1}{24}$ c. ax. 60	20/XX	Amblyopia; former strabismus.
			O. S. $+\frac{1}{0.5}$ s. ⊃ $+\frac{1}{24}$ c. ax. 150	...		O. S. $+\frac{1}{0.5}$ s. ⊃ $+\frac{1}{24}$ c. ax. 150 ..	20/—	Atr. correction 2 yrs. before.
34	19	24 "	O. D. $-\frac{1}{4}$ c. ax. 180 ⌊ ⊃ $+\frac{1}{4}$ c. ax. 90	20/XXI ?	3 "	O. D. $+\frac{1}{24}$ c. ax. 90	20/XX	Commencing myopia.
			O. S. $-\frac{1}{12}$ s.	20/XX		O. S. $-\frac{1}{60}$ c. ax. 60	20/XX	Atr. correction 2 yrs. before.
35	53	96 "	O. D. $+\frac{1}{2}$ c. ax. 30 ⌊ ⊂ $-\frac{1}{2}$ c. ax. 120	20/XX ? ?	3 "	O. D. $+\frac{1}{24}$ c. ax. 30 ⌊ ⊂ $-\frac{1}{2}$ c. ax. 120	20/XX	Atr. immediately after hom.
			O. S. $+\frac{1}{2}$ s.	20/XX		O. S. $-\frac{1}{2}$ c. ax. 60	20/XX	

TABLE V.—A Comparison of Homatropine and Duboisine in the Same Cases.

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Duboisine used.	Formula of Correction.	Vision.	Remarks.
1	43	24 hours.	O. D. $+\frac{1}{24}$ s. ⊂ $+\frac{1}{40}$ c. ax. 120	20/XXI ?	1 day.	O. D. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{60}$ c. ax. 120 ..	20/XX ?	Dubois. immediately after hom.
			O. S. $+\frac{1}{24}$ s. ⊂ $+\frac{1}{40}$ c. ax. 60 ..	20/XX ?		O. S. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{40}$ c. ax. 60	20/XX ?	
2	13	2 "	O. D. $+\frac{1}{12}$ c. ax. 120	20/XX ? ?	2 days.	O. D. $+\frac{1}{40}$ s. ⊂ $+\frac{1}{12}$ c. ax. 120° ..	20/XX ?	Dubois. immediately after hom.
			O. S. $+\frac{1}{24}$ s. ⊃ $+\frac{1}{18}$ c. ax. 90° ..	20/1		O. S. $+\frac{1}{24}$ s. ⊂ $+\frac{1}{18}$ c. ax. 105° ..	20/1	
3	23	8 "	O. D. Em.	20/XX	3 "	O. D. Em.	20/XX	Neuro-retinitis?
			O. S. Em.	20/XX		O. S. Em.	20/XX ?	Dubois. 2 mos. before hom.

TABLE V.—A COMPARISON OF HOMATROPINE AND DUBOISINE IN THE SAME CASES.—*Continued.*

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Duboisine used.	Formula of Correction.	Vision.	Remarks.
4	20	2 hours.	O. D. $-\frac{1}{\ }$ s.	$\frac{20}{XXX}$?	1 day.	O. D. $-\frac{1}{\ }$ s. (or $-\frac{1}{7}$) ⊃ $-\frac{1}{60}$ c. ax. 180	$\frac{20}{XXX}$?	Dubois. immediately after hom.
			O. S. $-\frac{1}{2}$ ⊃ $-\frac{1}{\ }$ c ax. 180	$\frac{20}{XXX}$?		O. S. $-\frac{1}{9}$ s. (or $-\frac{1}{10}$ s.) ⊃ $-\frac{1}{12}$ c. ax.	$\frac{20}{XXX}$	
5	28	24 "	O. D. + $\frac{1}{\ }$ s.	$\frac{20}{XX}$	1 "	O. D. + $\frac{1}{\ }$ s.	$\frac{20}{XX}$	Dubois. immediately after hom.
			O. S. + $\frac{1}{\ }$ s. ⊃ + $\frac{1}{\ }$ c. ax. 90 ..	$\frac{20}{XX}$		O. S. + $\frac{1}{60}$ s. ⊃ + $\frac{1}{60}$ c. ax. 90	$\frac{20}{XX}$	
6	19	1 hour.	O. D. + $\frac{1}{12}$ c. (or + $\frac{1}{60}$ c.) ax. 90 (?	$\frac{20}{XX}$	1 "	O. D. + $\frac{1}{360}$ s. ⊃ + $\frac{1}{60}$ c. ax. 90	$\frac{20}{XX}$	Dubois. immediately after hom.
			O. S. + $\frac{1}{12}$ c. (or + $\frac{1}{60}$ c.) ax. 90 (?	$\frac{20}{XX}$		O. S. + $\frac{1}{360}$ s. ⊃ + $\frac{1}{12}$ c. ax. 90	$\frac{20}{XX}$	Insuf. of Interni and spasm of A.
7	24	7 hours.	O. D. + $\frac{1}{\ }$ c. ax. 75	$\frac{20}{XX}$	1 "	O. D. + $\frac{1}{12}$ c. ax. 105	$\frac{20}{XX}$	Dubois. immediately after hom.
			O. S. + $\frac{1}{12}$ c. ax. 90	$\frac{20}{XX}$		O. S. + $\frac{1}{12}$ ax. 100	$\frac{20}{XX}$	
8	25	1 hour.	O. D. + $\frac{1}{18}$ c. ax. 90	....	7 days.	O. D. + $\frac{1}{60}$ c. ax. 105	$\frac{20}{XXV}$	Dubois. immediately after hom.
			O. S. + $\frac{1}{18}$ c. ax. 90	....		O. S. + $\frac{1}{60}$ c. ax. 75	$\frac{20}{XX}$?	
9	26	1¼ "	O. D. + $\frac{1}{10}$ c. ax. 75	$\frac{20}{XXV}$ +	1 day.	O. D. + $\frac{1}{60}$ s. ⊃ + $\frac{1}{60}$ c. ax. 75	$\frac{20}{XX}$	Dubois immediately after hom.
			O. S. + $\frac{1}{60}$ c. ax. 105	$\frac{20}{XX}$		O. S. + $\frac{1}{18}$ s.	....	
10	19	24 hours.	O. D. − $\frac{1}{10}$ c. ax. 180 ⌊ ⊃ + $\frac{1}{360}$ c. ax. 90	$\frac{20}{XX}$	3 days.	O. D. − $\frac{1}{30}$ c. ax. 180 ⌊ ⊃ + $\frac{1}{360}$ c. ax. 90	$\frac{20}{XX}$?	Dubois. 1 year previous.
			O. S. + $\frac{1}{60}$ c. ax. 90	$\frac{20}{XX}$		O. S. + $\frac{1}{360}$ c. ax. 90	$\frac{20}{XX}$	
11	39	72 "	O. D. + $\frac{1}{18}$ s.	$\frac{20}{XX}$	1 day.	O. D. + $\frac{1}{18}$ s. ⊃ + $\frac{1}{72}$ c. ax. 90 ...	$\frac{20}{XX}$ +	Dubois. immediately after hom.
			O. S. + $\frac{1}{18}$ s or + $\frac{1}{14}$ s. ⊃ + $\frac{1}{72}$ c. ax. 180	....		O. S. + $\frac{1}{12}$ s. (⊃ + $\frac{1}{72}$ c. ax. 90 ?)	$\frac{20}{XXV}$?	
12	18	24 "	O. D. + $\frac{1}{12}$ s.	$\frac{20}{XX}$	1 "	O. D. + $\frac{1}{12}$ s.	$\frac{20}{XX}$	Dubois. immediately after hom.
			O. S. + $\frac{1}{12}$ s.	$\frac{20}{XX}$		O. S. + $\frac{1}{\ }$ s.	$\frac{20}{XX}$	

13	38	24 hours.	O. D. $+\frac{1}{12}$ s. $\supset +\frac{1}{12}$ c. ax. 105 — O. S. $+\frac{1}{12}$ s. $\supset +\frac{1}{12}$ c. ax. 75 ..	XX XX	3 days	O. D. $-\frac{1}{24}$ s. $\supset +\frac{1}{12}$ c. ax. 105 ... — O. S. $-\frac{1}{24}$ s. $\supset +\frac{1}{12}$ c. ax. 75	XX XX	Dubois. correction 10 mos. before.
14	41	24 "	O. D. $-\frac{1}{24}$ s. ..... — O. S. $-\frac{1}{24}$ s. $\bigcirc +\frac{1}{12}$ c. ax. 120 ..	XX ? XX	1 day.	O. D. $+\frac{1}{24}$ s. or $+\frac{1}{24}$ s. ..... — O. S. $+\frac{1}{12}$ s. $\supset +\frac{1}{12}$ s. or $+\frac{1}{24}$ s. = $+\frac{1}{12}$ c. ax. 120	XX XXV	Dubois. immediately after hom. — Latter far more annoying.
15	33	26 "	O. D. $-\frac{1}{12}$ c. ax. 165 ..... — O. S. $-\frac{1}{12}$ c. ax. 75	XX XX ?	1 "	O. D. $-\frac{1}{24}$ c ax. 165 ..... — O. S. $-\frac{1}{24}$ c. ax. 75	XX XX	Dubois. immediately after hom. — Latter far more annoying.
16	18	120 "	O. D. $-\frac{1}{12}$ s. $\supset -\frac{1}{12}$ c. ax. 170 — O. S. $-\frac{1}{12}$ s. $\supset -\frac{1}{12}$ c. ax. 10 ..	XX XX	4 days.	O. D. $-\frac{1}{24}$ s. $\bigcirc -\frac{1}{12}$ c. ax. 180 ... — O. S. $-\frac{1}{24}(-\frac{1}{12})\supset -\frac{1}{12}$ c. ax. 180	XX XX ? ?	Dubois. correction 2 yrs. before. — Progressive myopia.
17	22	100 "	O. D. $+\frac{1}{12}$ s. $\supset +\frac{1}{12}$ c. ax. 105 — O. S. $+\frac{1}{12}$ s. $\supset +\frac{1}{12}$ c. ax. 105	XX XX	4 "	O. D. $+\frac{1}{24}$ s. $\supset +\frac{1}{12}$ c ax. 105 ... — O. S. $+\frac{1}{24}$ s. or $+\frac{1}{12}$ s.	XX ? XX ? ?	Dubois. correction 7 mos. before.
18	26	72 "	O. D. $+\frac{1}{12}$ s. $\supset +\frac{1}{12}$ c. ax. 105 — O. S. $-\frac{1}{12}$ c. ax. 75	XX XX	2 "	O. D. $+\frac{1}{24}$ c. ax. 90 ..... — O. S. $+\frac{1}{24}$ c. ax. 90	XX ? XX	Dubois. correction 6 mos. before.
19	34	24 "	O. D. $-\frac{1}{12}$ s. $\supset -\frac{1}{12}$ c. ax. 125 — O. S. $-\frac{1}{12}$ s.	XX + XX +	4 "	O. D. $-\frac{1}{24}$ s. $\supset -\frac{1}{12}$ c. ax. 120 .. — O. S. $-\frac{1}{12}$ s.	XX ? XX ?	Accommodative retinitis. — Hom. immediately after dubois.

TABLE VI.—A COMPARISON OF HYOSCYAMINE AND ATROPINE IN THE SAME CASES.

No.	Age	Hyoscyamine used.	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
1	29	25 hours	O. D. $-\frac{1}{4}$ s. ⊃ $+\frac{1}{4}$ c. ax. 165 ..	$\frac{15}{XXX}$	2 days.	O. D. $-\frac{1}{4}$ s. ⊃ $+\frac{1}{4}$ c. ax. 165 ...	$\frac{15}{XXX}$	Atr. immediately after hyosc.
			O. S. $-\frac{1}{10}$ s. ⊃ $+\frac{1}{10}$ c. ax. 90 ..	$\frac{1}{I}$		O. S. $+\frac{1}{10}$ s. ⊃ $+\frac{1}{14}$ c. ax. 85	$\frac{15}{XI}$	
2	10	24 "	O. D. $+\frac{1}{10}$ s.	$\frac{15}{XXX}$	2 "	O. D. $+\frac{1}{10}$ s. ⊃ $+\frac{1}{10}$ c. ax. 90	$\frac{15}{XXX}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{10}$ s. ⊃ $+\frac{1}{10}$ c. ax. 90 ..	$\frac{15}{XXX}$		O. S. $+\frac{1}{10}$ s. ⊃ $+\frac{1}{10}$ c. ax. 90	$\frac{15}{XXX}$	
3	16	40 "	O. D. $+\frac{1}{6}$ s. ⊃ $+\frac{1}{10}$ c. ax. 120 ..	$\frac{20}{XX}$	2 "	O. D. $+\frac{1}{6}$ s. ⊃ $+\frac{1}{18}$ c. ax. 70	$\frac{20}{XX}$	Atr. correction 6 years before.
			O. S. $+\frac{1}{10}$ ⊃ $+\frac{1}{10}$ c. ax. 90 ..	$\frac{20}{XX}$		O. S. $+\frac{1}{6}$ s. ⊃ $+\frac{1}{18}$ c. ax. 120	$\frac{20}{XX}$	
4	17	170 "	O. D. $+\frac{1}{20}$ c. or $+\frac{1}{12}$ c. ax. 90 .	$\frac{15}{XXI}$?	21 "	O. D. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{12}$ c. ax. 90	$\frac{20}{XXI}$	Marked choroido-ret. irrit.
			O. S. $+\frac{1}{10}$ s (As. $+\frac{1}{12}$ c.)....	$\frac{20}{XX}$		O. S. $+\frac{1}{10}$ s. ⊃ $+\frac{1}{12}$ c. ax. 90	$\frac{20}{XXI}$	Atropine 2 weeks later.
5	30	48 "	O. D. $-\frac{1}{10}$	$\frac{15}{XXI}$	1 day.	O. D. $+\frac{1}{10}$	$\frac{15}{XXI}$	Atr. immediately after hyosc.
			O. S. ———	...		O. S. ———	...	
6	21	1 hour.	O. D. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{12}$ c. ax. 90 ..	$\frac{15}{XXI}$	2 days.	O. D. $+\frac{1}{12}$ s. ⊃ $+\frac{1}{10}$ c. ax. 75	$\frac{15}{XXI}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{10}$ s ⊃ $+\frac{1}{10}$ c. ax. 60 ..	$\frac{15}{XXX}$		O. S. $+\frac{1}{10}$ ⊃ $+\frac{1}{10}$ c. ax. 60	$\frac{15}{XX}$	
7	11	120 hrs.	O. D. $-\frac{1}{5}$ s.	$\frac{15}{XX}$	2 "	O. D. $-\frac{1}{15}$ s.	$\frac{15}{XXI}$	Atr. immediately after hyosc.
			O. S. $\frac{1}{5}$ s.	$\frac{15}{XX}$		O. S. $-\frac{1}{15}$ s.....	$\frac{15}{XXI}$	
8	30	48 "	O. D. $-\frac{1}{10}$ s. or $-\frac{1}{10}$ s.....	$\frac{15}{XXI}$	1 day.	O. D. $+\frac{1}{10}$ s.....	$\frac{15}{XXI}$	Atr. immediately after hyosc.
			O. S. $-\frac{1}{10}$ s. ⊃ $+\frac{1}{10}$ c ax.....	$\frac{15}{XXX}$		O. S. $+\frac{1}{10}$ s. ⊃ $+\frac{1}{10}$ c. ax. 180 ...	$\frac{15}{XXI}$	
9	16	120 "	O. D. $-\frac{1}{14}$ s.	$\frac{15}{XXI}$	1 "	O. D. $+\frac{1}{14}$ s.....	$\frac{15}{XXI}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{10}$ s.....	$\frac{15}{XXI}$		O. S. $+\frac{1}{18}$ s.....	$\frac{15}{XXI}$	

10 12 48 hours	O. D. [illegible] s.	[illegible]	1 day.	O. D. + [illegible] s.	[illegible]	Atr. immediately after hyosc.
	O. S. [illegible] s.	[illegible]		O. S. + [illegible] s. ⊃ + [illegible] c. ax. 90	[illegible]	
11 13 24 "	O. D. [illegible] s.	[illegible]	4 days.	O. D. + [illegible] s.	[illegible]	Atr. immediately after hyosc.
	O. S. [illegible] ⊃ + [illegible] c. ax. 90 ..	[illegible]		O. S. + [illegible] s. ⊃ + [illegible] c. ax. 90	[illegible]	
12 24 48 "	O. D. — [illegible] s. ⊃ — [illegible] c. ax. 15 ..	[illegible]	.....	O. D. — [illegible] s. ⊃ — [illegible] c. ax. 10	...	Atr. correction 2 years before by another.
	O. S. — [illegible] s.	[illegible]	.....	O. S. — [illegible] s.	...	
13 43 60 "	O. D. [illegible] s. ⊃ [illegible] c. ax. 90 ..	[illegible] ?	21 "	O. D. + [illegible] s. ⊃ + [illegible] c. ax. 105 ...	...	Atr. correction 2 years before.
	O. S. [illegible] s. ⊃ + [illegible] c. ax. 90 ...	[illegible] ?		O. S. + [illegible] s. ⊃ + [illegible] c. ax. 75	...	
14 11 120 " ?	O. D. — [illegible] s. ⊃ — [illegible] c. ax. 20 ..	[illegible] ?	3 "	O. D. — [illegible] s. ⊃ — [illegible] c. ax. 20	[illegible]	Atr. correction 2 years before.
	O. S. — [illegible] s. ⊃ — [illegible] c. ax. 160 ..	[illegible] ?		O. S. — [illegible] s. ⊃ — [illegible] c. ax. 160 ...	[illegible]	Progressive myopia.
15 19 140 "	O. D. — [illegible] ax. 170 ⊃ + [illegible] c. ax. 80	[illegible]	3 "	O. D. + [illegible] c. ax. 90	[illegible]	Progressive myopia.
	O. S. — [illegible] ax. 60	[illegible]		O. S. — [illegible] c. ax. 60	[illegible]	Progressive myopia.

TABLE VII.—A Comparison of Hyoscyamine and Duboisine in the Same Cases.

1 25 96 hours	O. D. — [illegible] s. ⊃ — [illegible] c. ax. 150	[illegible]	10 days.	O. D. — [illegible] s. ⊃ — [illegible] c. ax. 160 ..	[illegible] ?	Spasm of accommodation
	O. S. — [illegible] s. ⊃ — [illegible] c. ax. 20 ..	[illegible] ?		O. S. — [illegible] s. ⊃ — [illegible] c. ax. 20 ...	[illegible]	Dubois, correction 1 year before.
2 32 120 "	O. D. ———	...	3 "	O. D. ———	...	Spasm of accommodation.
	O. S. — [illegible] s. ⊃ + [illegible] c. ax. 90 .	[illegible]		O. S. — [illegible] s. ⊃ + [illegible] c. ax. 90	[illegible]	Dubois, correction previous.
3 37 120 "	O. D. — [illegible] s. ⊃ + [illegible] c. ax. 150 .	[illegible]	13 "	O. D. + [illegible] s. ⊃ + [illegible] c. ax. 105 ..	[illegible]	Hemorrhea of lach. sac.
	O. S. — [illegible] s. ⊃ + [illegible] c. ax. 135	[illegible]		O. S. — [illegible] c. ⊃ + [illegible] c. ax. 105 ..	[illegible]	Hyosc. 3 mos. after dubois.

TABLE VIII.—A COMPARISON OF HOMATROPINE AND HYOSCYAMINE IN THE SAME CASES.

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Hyoscyamine used.	Formula of Correction.	Vision.	Remarks.
1	22	40 hours.	O. D. + ½ s. ⊂ + ½ c. ax. 90 .. O. S. + ½ s. ⊂ + ¼ c. ax. 90 ..	? ? ? ?	1½ hour.	O. D. + ½ s. ⊂ + ½ c. ax. 90 ... O. S. + ½ s. ⊂ + ¼ c. ax. 90	? ?	Hyosc. immediately following.
2	18	24 "	O. D. — ½ c. ax. 180 ⌊ ○ + ½ c. ax. 90 ..... O. S. — ½ s	?	6 days.	O. D. — ½ c. ax. 170 ⌊ ⊂ + ⅛ c. ax. 80 ..... O. S. — ½ c. ax. 60	+ +	Hom. 3 mos. before hyosc.

TABLE IX.— DUBOISINE WAS USED IN COMPARISON:

With atropine in 32 eyes—appearing superior in 7, equal in 12, inferior in 9 (2 ?); having been immediately followed in 1.

HOMATROPINE WAS USED IN COMPARISON:

With atropine in 70 eyes—appearing superior in 14, equal in 23, inferior in 22; having been immediately followed in 38.
With duboisine in 38 eyes—appearing superior in 8, equal in 18, inferior in 11; having been immediately followed in 24.
With hyoscyamine in 4 eyes—appearing superior in 0, equal in 3, inferior in 1; having been immediately followed in 2.

HYOSCYAMINE WAS USED IN COMPARISON:

With atropine in 29 eyes—appearing superior in 4, equal in 13, inferior in 10; having been immediately followed in 17.
With duboisine in 5 eyes—appearing superior in 4, equal in 1, inferior in 0.
With homatropine in 4 eyes—appearing superior in 1, equal in 3, inferior in 0.

REMARKS.

DR. JOHN GREEN, of St. Louis, asked concerning the relative frequency of the occurrence of conjunctival inflammation while experimenting with these drugs.

DR. RISLEY replied that in not a single case did it occur. The atropia caused a slight smarting on the second day, if not on the first, in some cases. In one or two instances where duboisia was used he had seen the eye get red, but all that was required to arrest the disturbance was to touch it lightly with a crystal of alum.

DR. GREEN said that in the class of cases which he met with he was compelled to forego the use of atropia, because of its producing distinct conjunctival inflammation, and sometimes quite severe. He had hoped that with the introduction of new mydriatics some agent would be discovered which could be used without the risk of such complication, but he had not found any such satisfaction. He recalled one case, that of an old man upon whom he operated for cataract, and used atropia without irritation, but two weeks afterward a single application of atropia started up an attack of inflammation, which continued for a number of days. He had not found any advantage from using daturia, and latterly he had employed duboisia, but it had given rise to some trouble. Certainly he met with cases in practice where there was a tolerance of such mydriatics up to a certain point, beyond which they could be no longer used on account of the conjunctivitis which they set up. He asked whether any of the members had had a similar experience.

DR. FRANCIS B. LORING, of Washington, D. C., said that in that city it had become necessary to use mydriatics the effects of which passed away rapidly, and on account of that fact he had had considerable experience in the use of duboisia and homatropia, neither of which, however, could be used in Washington during hot weather. Why they produced the irritation he did not know. To correct the tendency, the addition of sulphate of zinc, as suggested by Prof. Seely had yielded very good results. He had also found that nitrate of silver could not be used in Washington during hot weather.

DR. GREEN said that in his cases the addition of sulphate of zinc had not done any good. In hot weather in St. Louis also he had been obliged to be very cautious in using a mydriatic in a child's eyes, unless he could keep the patient sitting where it was cool for one or two hours. Such results, however, were not common in cold weather.

DR. S. THEOBALD, of Baltimore, had seen one or two cases in which slight inflammation had been set up after atropia had been used for a long time. In those cases he had used duboisia instead, and with good results. He referred to a case where a four-grain solution of atropia had been used four times a day for a week, and yet the pupil did not yield; but, as the irritation did not subside, he substituted a four-grain solution of duboisia, and within two hours the pupil di-

lated promptly, and by continuing its use all the adhesions were made to yield.

DR. WM. F. NORRIS, of Philadelphia, had used with great satisfaction the sulphate of hyoscyamine, and could corroborate all that Dr. Risley had said concerning its power to produce complete paresis of accommodation, and its calming effect upon the iris, choroid, and retina. He had not had sufficient experience in the use of the sulphate of daturia in inflammatory cases to enable him to speak positively, but he regarded it as a very good mydriatic for determining the refraction of the eye, the only objection being the time it holds on. He had not seen conjunctival irritation produced by it. He was surprised to hear that conjunctivitis had been caused by these mydriatics so frequently. He thought that he had not seen more than a half-dozen cases.

DR. W. S. LITTLE thought that Philadelphia was remarkably free from catarrhal affections of the conjunctiva, irrespective of agents employed in treatment. At least there was a very marked difference in that respect between Philadelphia and New York, and he had attributed it to the isolation of families in Philadelphia, whereas in New York all the poorer classes lived in tenement-houses. He had used atropia and duboisia quite extensively, but had not seen the catarrhal symptoms mentioned by Dr. Green produced by it.

DR. ROOSA asked Dr. Little if the difference which he had mentioned as existing between Philadelphia and New York held good with regard to phlyctenular conjunctivitis and keratitis, which formed a large proportion of cases a tout-door clinics.

DR LITTLE said there was no difference in that respect.

DR. E. W. BARTLETT, of Milwaukee, Wis., said that at one time many cases of catarrhal inflammation of the conjunctiva were seen in that city, but on investigation it was found that the atropia which had been and was being used was insoluble without the addition of some thing. Merck's atropine was then obtained, and since the use of that preparation the catarrhal trouble had disappeared. His impression was that many unfavorable results were due to impure drugs.

DR. GREEN said that no such influence was exerted in his cases, for he had taken special pains to secure pure drugs.

DR. S. C. AYRES, of Cincinnati, said that he had used homatropia for a number of months in the examination of refraction, and had found it very satisfactory. He had seldom seen conjunctival irritation from its use; but there was one point worthy of mention, and that was that the solution should be freshly prepared every two or three days, because it was liable to decompose or degenerate in some way so as not to be reliable. His results in its use had been satisfactory, accommodation returning usually within twenty-four hours. He had not seen cases in which its effects had been so prolonged as in those mentioned by Dr. Risley. Perhaps that had arisen from the fact that he had not taken the trouble to examine the patients for several days after its use.

DR. O. F. WADSWORTH, of Boston, said that catarrhal conjunctivi-

is occurred in that city, but he had rarely seen any trouble from the use of mydriatics, even though they were continued for a long time.

With regard to the freshness of the solution of homatropia spoken of by Dr. Ayres, it had not seemed to him that such degeneration occurred in all preparations; for a friend of his brought him a solution which he obtained in Breslau, and he used it until more of the drug could be obtained here. But a small quantity remained in the phial, and within two or three weeks he used it and obtained just as prompt effect upon the pupil as when he first received the solution made nearly a year before. With regard to duboisia, the symptom of dizziness had not been mentioned so prominently as he could have expected. In these instances, certainly, when he had taken pains to use a small quantity—not more than one-third of a minim of a one per cent. solution—there was distinct and troublesome vertigo.

Dr. Theobald, of Baltimore, referred to a case in which he used two drops of a four-grain solution of duboisia in each eye, and the result was complete paresis and delirium, which lasted for several hours.

The President had seen a case in which the unpleasant effects of duboisia, almost precisely parallel with those mentioned by Dr. Theobald, were produced in a person with whom atropine had disagreed, and there was also iritic and conjunctival irritation. The ill-effects of duboisia were produced within twenty minutes, and were rather alarming. There was one point which had not been brought out by the discussion. He had been led to attach a good deal of importance to persistent spasm of the ciliary muscle in many ametropic eyes—a spasm which did not yield to the ordinary use of atropine, and which he had found was more obstinate than he had formerly been led to think. Many of his corrections, made in the usual way, and with the usual precautions and with the usual mydriatics, had subsequently been proved to be incorrect. He had therefore grown to be far more critical in testing for total paralysis than formerly. He had been compelled in many cases to use atropine two, three, or four weeks, and produce toxic symptoms, in order to get the necessary effect upon the eye. With regard to homatropia, he had been led to think that it had only a fleeting and partial control over accommodation. He wished to suggest to the members that tough spasm of accommodation was a very common occurrence.

TWO CASES OF SARCOMA OF THE CHOROID, PRESENTING UNUSUAL CLINICAL FEATURES.

BY CHARLES J. KIPP, M.D.,

NEWARK, N. J.

CASE I.—Mrs. J. F., aged forty-four, a large, robust-looking woman, consulted me in November, 1873, for blindness of her left eye. She stated that for the past four months she had noticed gradual failure of sight in this eye; that the eye had never been inflamed, and had never given her any pain. Subsequently, I learned that she had often been beaten on the head by her husband, but she did not remember to have ever been struck on the eye. On examination, it was found that she had only perception of light in this eye. Tn. The anterior parts of the eye were perfectly normal, and the motility of the eye was unimpaired in all directions. On looking into the eye with the ophthalmoscope, attention was at once drawn to a hemispherical tumor which projected from the nasal half of the sclerotic into the vitreous chamber, nearly to the visual axis. Anteriorly the base of the tumor reached apparently to the periphery of the choroid. The tumor was of a yellowish red color, and perfectly smooth, velvety surface. It was covered by the transparent retina, which was in immediate contact with it everywhere, except at the lower anterior junction of the tumor and the choroid, where it was detached. The retinal vessels were plainly visible on the tumor, and were of normal size and color. The disc could not be seen on account of the tumor. The outer half of the fundus presented nothing abnormal. In the lower part of the eye there was a shallow detachment of the retina. The anterior part of the tumor was also distinctly seen through the dilated pupil in ordinary daylight, and was repeatedly examined by me with sunlight, in the hope of discovering choroidal vessels on its surface, which I, however, failed to find. Viewed by daylight, the tumor was of a uniform pinkish color. I kept the patient under observation for some weeks, but failed to notice during this time evidences of growth in the tumor, or other changes in the eye. Since then I have lost sight of the patient.

Case II. Mrs. E. C., a very fleshy English woman, aged forty-six, the mother of eleven children (five of whom are deaf-mutes), consulted me in the middle of June of this year, with regard to her left eye. She stated that this eye was blind, and that she was greatly worried by a constant "fluttering" before it. Her parents and grandparents were healthy people, who died at a good old age. She is hysterical, but otherwise in good health. Her attention was first drawn to this eye seventeen years ago, when she noticed black specks floating before it, which have remained ever since. Her sight has been impaired for some years, but during the last year this impairment has greatly increased. She can now recognize very large letters only when held to the left, and very close to the eye. Since three or four weeks she has noticed a constant "working" or "fluttering" in this eye, which has greatly alarmed her. When asked as to what this peculiar sensation resembled, she compared it to muscular twitchings. She had no pain in this eye, and was sure that it had never been hurt.

On examination, it was found that should count fingers only in the left half of the visual field. Tension was normal. The anterior half of the eye was apparently perfectly healthy; the pupil was of the same size as that of the other eye, and responded readily to light. The ophthalmoscope revealed a hemispherical tumor which projected from the temporal half of the sclerotic nearly to the visual axis. The tumor was of a yellowish red color, with here and there spots of darker color; it was perfectly smooth and closely covered as far as visible by the slightly hazy retina. The retinal vessels over the tumor presented nothing abnormal. Anteriorly the tumor extended apparently close to the ciliary body, and upward and downward, about half way between the horizontal and vertical meridians. The vitreous was slightly hazy. The disc was somewhat veiled, but otherwise normal. The retina in the nasal half presented nothing abnormal, whereas in the lower part of the eye it was detached, but transparent. In this, as in Case No. 1, the tumor could be seen through the dilated pupil in daylight, and appeared then of a pinkish color. Examination with oblique illumination and magnifying-glasses failed to reveal any vessels beneath the retina covering the tumor.

The patient was seen every few days for several weeks, during which time the eye underwent no change.

From this description it will be seen *that the eye presented all the ophthalmoscopic symptoms of detachment of the choroid*, as described by v. Graefe (*Archiv für Ophthalmologie*, Bd. iv., 2, p. 227); Knapp

("Die Intraocularen Geschwülste," p. 200); Liebreich (*Archiv f. Ophthalmologie*, Bd. v., 2, p. 259); Schweigger ("Handbuch d. Augenheilkunde," p. 454); and Wecker (Graefe-Saemisch "Handbuch d. Augenheilkunde," Bd. iv., p. 662). The cases described by v. Graefe and by Liebreich were in every particular like the above. One symptom was, however, absent in my case, which Wecker considers of the greatest importance in the differential diagnosis between detachment of the choroid and intra-ocular tumor—great diminution of tension. In the cases above reported the tension was neither diminished nor increased in comparison with the healthy fellow eye.

On the other hand, the cases here reported were unlike the great majority of large choroidal tumors, in this that the detachment of the retina was quite limited, and that, notwithstanding the large size of the tumor, the eye exhibited no symptom of secondary glaucoma.

Although I felt confident that the eye contained a choroidal neoplasm, I proposed to the patient to make an exploratory incision in the sclerotic, and, if my diagnosis should be found to be correct, to enucleate the globe. Consent having been given, and the patient being under the influence of ether, I made a meridional incision in the conjunctiva over the middle of the insertion of the tendon of the rectus externus, detached this tendon, and made a meridional incision in the sclerotic, commencing at the middle of the insertion of the tendon, and extending 1 ctm. backward. On separating the edges of this incision with two small foreign-body hooks (Knapp's), used as retractors, a dark-colored gelatinous mass of about the size of a French bean protruded, and was cut off with scissors. Further examination showed the tumor to extend beyond either end of the incision. The diagnosis having been thus confirmed, I enucleated the eye in the usual manner. The operation was not followed by any reaction, and the patient was discharged from the hospital six days after the operation. As yet there are no signs of a relapse.

The anatomical examination of the eye showed a large tumor, of an irregularly round form, situated in the choroid; its base extending from the orbiculus ciliaris to a little beyond the macula lutea and about 1 ctm. above and below the horizontal meridian. The tumor was of a yellowish red color in its anterior half, and of a darker hue posteriorly. Its surface was perfectly smooth and velvety, and was covered smoothly by the retina everywhere except at its base, anteriorly and posteriorly when this membrane was slightly detached. With the exception of a shallow detachment of the retina in the lower part, the eye presented no other abnormity.

Examined microscopically, the tumor was found to be a very vascular, melanotic sarcoma, composed chiefly of spindle-shaped cells. This tumor had doubtless started from the outer layers of the choroid, as the chorio-capillaris was preserved, in part at least, everywhere except at the summit of the tumor. At this point the lamina elastica was the only part of the choroid remaining. The elastic lamina was over some parts of the tumor much thickened by "colloid" substance. The pigment-epithelium was proliferous. Of the lamina fusca nothing could be discovered in the region of the tumor. The retina was but loosely attached to the tumor, except at its summit, where the retina was more closely connected with the lamina elastica. The retina over the tumor presented the condition usually described as œdema retinæ. The layer of rods and cones had entirely disappeared, and pigment-deposits were scattered through the outer layers. The tumor had not invaded the sclerotic. Beyond the region of the tumor the choroid and the retina presented nothing abnormal. The optic nerve was healthy.

Remarks.

Dr. John Green, of St. Louis, had seen choroidal sarcoma quite large, with but little detachment except in immediate connection with the tumor. The tumor started from the anterior portion of the choroid, it was true, but it had projected beyond the anterior axis of the eye. It had cut off central vision, but lateral vision remained. He had also seen a case in which, at the time of the enucleation, the tumor was quite large, occupying nearly one-half of the vitreous. And although there was considerable detachment of the retina, such detachment did not exist early.

Dr. J. F. Noyes, of Detroit, Michigan, referred to a case as follows: Some years ago, he had a case similar to one reported by Dr. Kipp. In that case there was considerable detachment of the retina—so much so as to shut off the passage of light into the eye almost altogether. He detected a sarcoma after having drawn off the subretinal fluid with a hypodermic syringe. The retina fell out of the way so that he could look in and see a bluish prominence. He suspected the existence of a malignant growth, but was unable to get the consent of the patient to enucleate the eye until some months afterward, when loss of sight recurred from reaccumulation of fluid and pushing the retina forward. The operation was then performed, and the tumor mentioned was found, which was as large as a large-sized pea, and grew from the posterior portion of the fundus, perhaps one-fourth of an inch to the outside of the optic nerve. It was a spindle-celled sarcoma.

Dr. Green suggested that Dr. Noyes's case was one of local, and not total, separation.

DR. NOYES said that it was so considerable as to shut off the entrance of light into the eye.

DR. GREEN asked concerning the condition of the retina at the examination of the specimen.

DR. NOYES replied that it was nearly, but not totally, separated. As it passed over the tumor it was adherent to it, and immediately upon the sides of the tumor it began to be detached. He was able to trace the retina distinctly over the tumor.

DR. WADSWORTH, of Boston, said that he had examined a choroidal tumor as large as that presented by Dr. Kipp, and there was no detachment of the retina.

DR. KIPP said that the specimen presented did not represent the whole tumor, because a portion was removed when the sclerotic was opened.

The PRESIDENT had seen a choiroidal tumor of considerable size, without detachment of the retina.

A CASE OF SUDDEN AND COMPLETE LOSS OF VISION AFTER LARGE DOSES OF QUININE.

BY F. BULLER, M.D.,

MONTREAL, CANADA.

THE case I am about to relate the details of is, I think, one which should be placed on record first, because few such have as yet found their way into ophthalmic literature; and second, because those that have been described are all, more or less, incomplete; not that I claim for this one a foremost place in regard to completeness; on the contrary, I am painfully aware of many imperfections for which I am myself at least partly to blame, in not having taken more exhaustive notes at the time of its occurrence. I was, however, in a position to observe the order of events from a very early period, until, as I believe, the ultimate result has become manifested, and in so doing it may be that I have supplied some links in the chain of evidence that connects certain morbid conditions of the optic nerves, and certain cases of defective vision, with an antecedent cinchonism.

For obvious reasons we cannot expect to meet with a pure, uncomplicated case of quinine blindness, and it is only by summarizing the features common to each supposed case of the kind that we obtain an accurate clinical picture of the toxic effect of cinchona bark, or its active principles, on the organs of vision. The picture may be said to be still in the artist's studio awaiting the finishing touches essential to its perfection.

On the 27th of August, 1879, I was called in consultation by the medical attendant of a lady recently confined of a healthy child, and now (at that time) affected with a sudden and complete loss of vision. The patient was a highly educated and intelligent woman, about thirty-four years of age, and mother of several children; all of whom were healthy and vigorous.

She had uniformly enjoyed excellent health, though not feeling quite strong since an attack of diphtheria, about a year previously.

Her recent parturition had not been in any way complicated until the fifth day after birth of the child, when symptoms supposed to be indicative of septicæmia set in, and rapidly assumed so grave a character that her medical attendant called another physician in consultation, and it was agreed that she should at once commence taking large doses of quinine.

Two twenty grain doses were administered in the first twenty-four hours, the same during the second, and the second night she also took thirty or forty grains of chloral, on account of active delirium following intense headache during the day.

The third day she still had high fever, and took three doses of twenty grains each, also a large dose of chloral at night, for the same reason as before.

On the following day the fever and delirium had passed off, but she was found to be absolutely blind. There is some doubt as to whether she could see the day previously; she had been "too much out of her head to remember." I saw her for the first time about one o'clock the same day that the blindness was discovered, and found her condition as follows:

The patient, beyond a feeling of languor and weakness, with slight headache or fulness in the head, described herself as being free from discomfort, but that she was in absolute darkness, and I observed mentally very much depressed. After the first two or three doses of quinine she had experienced a good deal of roaring in the ears and some hardness of hearing, which, however, had passed off, leaving now only a slight tinnitus. Externally the eyes presented nothing abnormal. Conjunctiva of lids and globe neither anæmic nor hyperæmic. Tension and movements of the eyeballs perfectly natural. The pupils were widely dilated, and did not respond perceptibly to the strongest illumination, nor when told to look at the lamp-flame held close to the face; therefore, presumably not to the effort of accommodation. With the lamp in that position there was a faint sensation of light, and when facing the bright sky was conscious of a dim,

diffuse sort of light, though unable to say when the shadow of a hand was passed in front of the eyes.

The refractive media were perfectly normal, and Rf. by ophthalmoscope = E.

The ophthalmoscopic appearances of the fundus, noted at this first examination, were as follows:

L. E.—The papilla presents rather a deep physiological cup, but otherwise has "the roseate hue of health." There is a diffuse bluish gray haziness or turbidity of the retina for a considerable distance in every direction, but most markedly so in the region of the macula, the centre of which by the direct method has the appearance of a cherry-red patch about one line in diameter. There were no retinal hemorrhages, and no choroidal changes anywhere discoverable. The retinal veins, as compared with the arteries, are unusually large, but they are decidedly paler than one commonly meets with in the healthy eye; in other words, the color contrast between the two sets of vessels is a less conspicuous feature than usual. The arteries are entirely normal, except they are, perhaps, actually or relatively somewhat diminished in calibre: arterial pulsation is readily induced by pressure upon the sclerotic. The opacity of the retina nowhere obscures the blood-vessels, and the small branches converging toward the macula are unduly conspicuous. Passing toward the periphery, the retinal cloudiness gradually fades, and at or beyond any point, half-way between the nerve and the ophthalmoscopic periphery, there is no perceptible deviation from physiological conditions.

A most careful examination of the right eye revealed the same changes, though, perhaps, not quite so pronounced as in the left.

The general condition was satisfactory. Temperature and pulse normal and lochia natural: heart, lungs and vascular system presented no abnormality. There was a trace of albumen in the urine, but, as the specimen examined had not been drawn by the catheter, it probably contained some of the lochial discharge.

I was not at that time familiar with the possible effects of large doses of quinine on the organs of vision, but as there seemed no other reasonable explanation of the peculiar phenomena of this case, I expressed the opinion to the attending physician that they were very likely the result of cinchonism, and emphasized the belief, which I still hold, that, however caused, we had to deal with a case of acute retrobulbar neuritis or perineuritis. The urgency of the symptoms seemed to call for active measures. It was, therefore, decided to apply four leeches to each temple and take an additional quantity of

blood by means of Heurteloup's apparatus applied to the temples. Mercurial inunctions, one drachm morning and evening, were also prescribed.

At bedtime, a sixth of a grain of pilocarpine was injected subcutaneously.

Aug. 28th.—*Status idem;* patient exceedingly depressed and despondent, but clear in her mind. Pilocarpine acted fairly on skin; to be repeated at bedtime.

Aug. 29th, at 9 A.M.—Condition unchanged, except that there was not a trace of headache, and the pupils are a trifle less dilated.

At 5 P.M. was able to distinguish bars of light in the Venetian blinds; thought she had seen the nurse passing in front of her several times, and was positive she had seen the dial of a small bedroom clock on the mantle-shelf across the room. She had also caught glimpses of some large letters in a motto hanging on the wall above the clock. Pilocarpine injection repeated at bedtime. I may here mention that there was no lacteal secretion, but that this ultimately became established.

Aug. 30th.—Did not sleep well last night, and is irritated by slight noises, but otherwise feels well. Can now tell the time of day by the small clock across the room, but has great difficulty in finding it. Cannot see the flame of a lamp held close to the face. Can count fingers at ten feet distance, but not at one foot.

Pupils still considerably dilated, but respond slightly to light.

The ophthalmoscope shows a decided diminution in the opacity of the retina.

Aug. 31st.—Vision steadily improving. Can count fingers at any distance from one foot to twenty, or more. Pupils smaller, and react quite distinctly to-night, and in the effort of accommodation can also clearly define the flame of the lamp. She can tell the red and blue letters in the motto across the room.

The retina is fast assuming a normal appearance. The macula, though still redder than normal, does not appear as a sharply defined, red patch, as at first.

September 1st.—Visual area becoming wider at fifteen feet distance. Vision appears to be clear over a space of about one foot in diameter, and indistinct over an area of about two and one-half feet.

Sept. 3d.—Can distinguish all colors in a subdued light, when the blinds are closed, but not when they are open. The retinal opacity is now very slight, but I notice now, for the first time, a marked

diminution in the calibre of the retinal blood-vessels, both arteries and veins, but especially the former. Artificial pulsation can still be elicited by pressure, but not readily.

The optic nerves are both much more pale than normal; if seen for the first time, I should say the case was one of moderately advanced atrophy. Vision about the same as yesterday; she thinks less distinct, if there is any difference: but she looks pale and worn. The mercurial inunctions were omitted yesterday, and small, increasing doses of iodide of potash substituted.

Sept. 4th.—Retinal vessels now very small, certainly not half their normal size: the usual smaller vessels about the discs have nearly all disappeared.

On account of the progressing ischæmia retinæ I performed paracentesis of both anterior chambers and reopened the wounds in the evening. The cornea was anything but anæsthetic.

Sept. 5th.—Thinks vision is improving. Papillæ very pale, and retinal vessels about the same as yesterday. I gave amyl nitrite and watched the result with the ophthalmoscope; it unquestionably diminished the pallor of the nerves, and for the time somewhat increased the size of the arteries. She expressed herself very positively as to the effect, viz., that she could see more clearly after the inhalation.

Sept. 6th.—The field of vision is widening, as proved by the fact that when looking at the opposite wall she can see each corner of the room with both eyes open, though very dimly. Reads Jaeger 8 fluently without glasses. Repeated the amyl inhalation.

Sept. 7th.—The mercurial inunction was continued after the 3d until the present time, and the gums are just beginning to show its effects; has taken 120 grains iodide of potash in the last twenty-four hours; there is slight iodism. (The mercury was not used any more, but the iodide was continued in smaller doses for about a month, and then gradually omitted). There is a faint, but not uniform cloudiness of retina near macula. She is a good deal annoyed by seeing blue and green patches or large spots before the eyes, and also flashes of light.

Sept. 8th.—Reads Jaeger 4 fluently at 18″ distance; each visual field tested roughly with the hand, seems to be about one foot in diameter, and the limitation is about equal in every direction.

The peripheral portions of the retinæ are now slightly cloudy and finely striated. I suppose there is a loss of transparency in the nerve fibre layer of this part of the retina, possibly overlooked when the

central portions were more conspicuously turbid. The retinal vessels can with difficulty be traced to the ophthalmoscopic periphery. Phosphenes are perfect.

Sept. 21st.—Has used amyl herself once or twice daily, and says she always sees better after the inhalation; concentric limitation of the visual field is now the chief difficulty; has on this account some trouble in getting about; reads Jaeger 2 easily and has no fault to find with distant vision; both retinæ are clear of opacity, and the papillæ are not so pale as they have been; is less annoyed by photopsia or chromatopsia than formerly.

Injections of strychnia were given from September 22d till 28th, but were abandoned on account of inducing headache and "nervousness."

On the first of November I examined the fields of vision on the blackboard, and found each about the same. At 14″ distance that of the left eye measures upward 8″, downward 9½″, inward 8″, outward 12″; beyond these limits there is a zone of very dim, uncertain perception.

Vision = $\frac{20}{30}$. Can distinguish all colors readily at centre only. Although not so much annoyed by chromatopsia, is often greatly distressed by vivid after-images of any object she may happen to have looked at for a few moments. Any circular object, such as a plate, or cup, always looks as if it were spinning round rapidly, so that looking at such objects gives her a sort of giddy sensation. After looking at a picture with a black frame for a few moments, and then turning the eyes away, she sees the picture quite distinctly, but with a strongly luminous gold-colored frame. A room lighted by artificial light looks very dark, except just around the light; she cannot help imagining the gas is bad, and in going about the room has some trouble in avoiding small pieces of furniture.

After November 28th I saw very little of the patient, but was informed from time to time of her continued improvement. She recovered almost her usual health and strength, and was reported as being able to see quite comfortably. On the 28th of June last, that is, after an interval of twenty-two months from the date of last note, I had an opportunity of again examining the eyes, and taking a map of the field of vision of one of them (the left eye) with Carmalt's perimeter. This chart shows the result roughly estimated; the right eye is in a similar condition.

The outline gives the field for the usual small square of white cardboard, and indicates where it was distinctly seen as such. There is a faint perception for a short distance beyond these limits.

There is a total abolition of all peripheral sense of color, but central color-perception is perfect; at least the small colored squares, red, yellow, green, and blue furnished with Carmalt's perimeter, are all perfectly distinguished at the centre, but not as far as 5° from the centre in the left eye. The right eye has a trifle larger area for color-perception, and a little larger for yellow than for any other color.

Central vision is perfect—$\frac{20}{20}$ with each eye. She has abstained from all unnecessary use of the eyes, but is able to exercise them in near vision without fatigue or inconvenience. The pupils are of medium size, respond to light, and contract during accommodation in a normal manner; the latter is unimpaired. The ophthalmoscopic changes are identical in each eye, and do not differ much from the appearance presented in November, 1879.

The nerves are both pale, but not white. They possess the semi-translucent appearance of health. The formerly deep physiological cup is more shelving, like that of atrophy. Lamina cribrosa fairly distinct. Both arteries and veins are exceedingly small, certainly not more than one-third as large as in the normal condition. The arteries cannot be traced as far as ophthalmoscopic periphery, and some of them have white borders for a short distance. Some of the larger veins, however, are not thus lost. The retina is in other respects entirely normal, and there are no choroidal changes. The subjective sensations of light and the after-images that used to be so troublesome are now only occasionally noticed when tired, or when suffering from "nervous headaches," from which she suffers every three or four weeks, more or less severely, ever since the eyes have been affected.

Darkening the room does not impair her power of reading fine print any more than it does my own, but she is under the impression that between sundown and dark she does not see as well as formerly, or, in other words, the defect of vision is most noticeable at that time of day.

The condition of things has undergone so little change in the past eighteen months that I think we are justified in assuming the final result has been attained.

In looking over the literature of "Quinine blindness," I have not been able to discover any satisfactory explanation of the probable pathological lesions producing such remarkable, and I may even say characteristic intra-ocular changes.

In the first place, the question arises: What is the situation of the

primary lesion—I mean the one which causes the sudden loss of vision, for that seems to be the first ocular symptom noticed in these cases? The locus of the morbid process, whatever it may be, can, I think, be found in one of three situations: First, within the cranial cavity; second, within the eye; third, in the course of the optic nerve between chiasma and eyeball.

The first assumption I regard as wholly untenable. The second is almost equally so, for, at the time when the blindness is greatest, the intra-ocular changes are comparatively insignificant. For the third, there are several facts which to my mind point strongly to this as the seat of the chief pathological changes.

I have found that a galvanic current applied directly to the optic nerve of the rabbit will speedily induce a blanching of the retina and nerve similar to that which occurs in those cases of "quinine blindness." I once, accidentally, produced a strikingly similar picture in the human eye, by the same means, in treating a deep-seated venous tumor of the orbit by galvanism.

A platinum needle, carrying a current from four carbon-zinc cells, was introduced quite to the back of the orbit, and from its direction and effects must, I think, have penetrated the optic nerve. The pupil, after the application had lasted about a minute and a half, became widely dilated, and the patient averred she could not see. A few minutes later I found vision with this eye reduced to counting fingers at one foot; the retina whitened in the disc and macula regions; the arteries slightly reduced in calibre; the nerve decidedly pale.

In this case the retina cleared up in a few days, but the optic nerve remained very much blanched, and the arteries very small. The diminution of vision, however, which finally settled down at $\frac{20}{200}$, appeared to be uniform; there was no concentric limitation of the visual field, and no color-blindness.

The sudden blindness from cinchonism may, I think, be explained best by assuming a rapid effusion into the lymph spaces around the nerves, producing what might be called an external strangulation of the nerves, too transient to induce the phenomena of papillitis, but sufficient to cause œdema and blanching of the retinæ, and, no doubt, in some way, only to be decided by a post-mortem investigation, a permanent impediment in the blood-carrying capacity of the central arteries.

Pressure exercised upon the optic nerve as it passes through the porus opticus, whether from within, as in glaucoma, or from without,

as in the supposed case, would probably first impair or destroy the functions of the external nerve-fibres, in either case supposing these supply the peripheral portions of the retina, there would be concentric limitation of the visual field, and it is not difficult to understand why this form of limitation should be more perfectly concentric in the external or perineural, than in the internal or glaucomatous strangulation.

Such pressure, if suddenly induced, might, for a time, destroy all vision, and still admit of perfect restoration in the less injured central nerve-fibres.[1]

REMARKS.

DR. JOHN GREEN, of St. Louis, said that it seemed to him, in a case with such a complication, we were not justified fully in attributing the condition to the remedy employed, even though it was used in what might be called excessive doses. The puerperal condition, with threatened septicæmia, could account for very grave complications, not excluding the possibility of such as had been described as existing in the eyes of Dr. Buller's patient, without charging it upon the remedy employed. Certain it was that in the Southern and Western States quinine had been used in large doses; indeed, the remedy had been grossly abused, and it occurred to him occasionally to see a patient with atrophy of the optic nerve attributed to the taking of "too strong medicine," as they generally put it, and generally in connection with some grave form of disease, such as congestive fever, etc. The number of cases, however, in which there was a charge by the patient in such cases, was certainly small; and fifteen years' practice in the West had led him to look with extreme doubt upon reported cases of optic nerve lesion or blindness attributed to quinine-poisoning. He could not say what might not occur, but he believed that such cases were certainly very few. He was inclined to attribute the trouble, not to the remedy, but to the disease for which the remedy was administered. The remedy may have aggravated the condition developed.

DR. D. B. ST. JOHN ROOSA, of New York, thought that Dr. Green would be very much troubled to explain the singular coincidence in the case reported, namely, that a woman threatened with septicæmia, or having septicæmic symptoms, took large doses of quinine, had what had been known as its peculiar physiological effect upon the ears and the head, and at the same time became blind. He thought that it was, perhaps, going too far to excuse the quinine by the assumption that septicæmia might have caused the neuritis, and, if not, a certain amount of atrophy, certain changes in the retinal ves-

[1] In a further conversation with the family physician of this patient, doubt has been raised whether on the third day of treatment two or three doses of quinine were taken.—F. B.

sels. He thought that Graefe was the first who published any case of this kind, and he believed that the weight of evidence was in favor of Graefe's opinion that the retinitis in his cases was caused by the quinine. But, passing by Graefe's cases and coming down to his own, which he believed was next in publication,[1] he thought it would puzzle Dr. Green to explain the symptoms in his case upon any theory except that they were produced by the toxic effects of quinine. It was possible that he might make the criticism that those effects were due to alcohol; but then again, the profound deafness which passed away would invalidate that objection. It was interesting to Dr. Roosa to note that, in his case, which he saw in the stage in which the changes affecting the nerve occurred, the lesions corresponded exactly with those reported in the case the history of which had just been read, and those reported in a case by Dr. Voorhies, and published in the "Transactions of the American Medical Association." His first patient died within the present year, from some disease of what nature he knew nothing; but, up to within a few months of his death, there remained the same appearances given in his description of the case: telescopic vision, $\frac{20}{20}$.

Then, the other case which he saw, a Cuban lady who was brought to him for examination some years after the changes in the retina had occurred, presented the appearances and history which warranted him in thinking that the disease was caused by the remedy, and not by the attendant circumstances. Knowing it to be somewhat irrelevant, he would say a few words concerning the administration of quinine to prevent septicæmia or pyæmia. Occasionally we had occasion to use quinine in that manner, but he was firmly convinced that giving quinine for that purpose was an irrational procedure, hastened the doom of the patient if pyæmia had occurred, and lessened the only chance of elimination, through the bowels, the skin, and other emunctories, of the poison of that disease.

One thing more, he did not know whether Dr. Buller thought that his treatment had anything to do with the ending of the case. His own patient had practically no treatment except hygienic care, and he did just as well, and the result was just as good as in the case narrated by Dr. Buller. Perhaps, if he had seen the case early, he would have used the same means; but the patient reached the final condition, in which he remained three years, without special medication.

Dr. Green said that he did not deny the possibility of the toxic effect of quinine producing unfavorable results in very exceptional cases; but, at the same time, he thought that in most cases published it had been difficult to clearly distinguish between the results of the disease for which quinine had been given, and those produced by the toxic influence of the quinine itself. Secondly, the toxic effects produced by quinine upon the healthy organism might simply aggravate the abnormal processes already existing, or establish new

[1] Knapp's Archives, vol. viii., p. 392.

ones, and in the latter case he should not dare to say positively that they were due to the quinine rather than to the aggravated symptoms of the original disease. There had been a great deal of talk among the people concerning the bad effects produced by quinine, but he had not met with a case which bore the process of sifting when the trouble had been attributed to the remedy, and had found equal probability in favor of the condition being due to the co-existing disease, and not to the remedy.

DR. W. S. LITTLE, of Philadelphia, had seen, during the last winter, at the Jefferson Medical College Hospital, two cases in one week, in which there was atrophy of the optic nerve and retina, supposed to be due to quinine. Both patients, one eighteen and the other twenty-six years of age, after taking large doses of quinine to break up an attack of intermittent fever, suddenly became blind. In the first case, about half sight remained; in the second, there was slight improvement in both eyes.

DR. RISLEY directed attention to the fact that a case was published some time since, in which hemorrhages into the eye-ground were found after an intermittent paroxysm.

DR. BULLER thought that Dr. Roosa had answered Dr. Green's objection to the possibility of his case being one of blindness from quinine. It could not be expected ever to get a case of pure quinine blindness, because quinine would probably never be taken in sufficiently large doses to produce such a result without the complication of disease. But the cases published had all presented some strikingly characteristic feature which must be attributed to some common cause, and that had been claimed to be quinine. Common features were loss of eccentric vision, entire loss of peripheral color-sense, with small central field of vision, exceeding smallness of the retinal vessels, pallor of the optic nerve, etc. Taking these features into consideration they must be attributed to one common cause, and that cinchonism. He thought that it was an inflammatory affection, and that it should be treated accordingly; at least, judging from the result, for it was better than most of those which had been reported. It might be that his better result was due to not prolonging the use of the quinine. He thought that the case mentioned by Dr. Risley did not come into the same category, because no such changes had been found in this class of cases.

A CASE OF MARKED NARROWING OF THE FIELD, WITH DIMINISHED ACUITY OF VISION, FOLLOWING THE USE OF DUBOISIA, AND PRESUMABLY A RESULT OF THE USE OF THAT DRUG.

By J. P. WORRELL, M.D.,

TERRE HAUTE, IND.

MRS. L. R., aged thirty six, complained of difficulty in using the eyes for near work. After reading a short time, her eyes would give out, causing blurring of letters; slight heaviness over the brows. Thought vision for distance was unimpaired. Examination of the eye shows nothing unusual; the bulbar and tarsal conjunctiva clear and transparent, with very slight hyperæmia. No ciliary injection. Deep anterior chamber. Pupil 2.5 mm. in diameter; active under alternation of light and shade.

Ophthalmoscope showed fundus clearly. Beyond slight striation, nothing abnormal to be noted. Vertical vessels seen with $+\frac{1}{4}\frac{1}{8}$. Horizontal vessels blurred by this glass.

In each eye, V.$=\frac{15}{XXX}$. Vertical lines seen brightest. Jaeger 3 read from 10–12″ with some difficulty.

For the purpose of correcting the anomaly of refraction, a solution of duboisia, 2 gr. to fl. ʒ j. was ordered to be used three times a day. This had been instilled into each eye three times, when, on the afternoon of the 18th of July, she observed the sight of left eye much impaired. She continued, however, to use the drops until the following afternoon, when she again visited my office. O. S. could then count fingers at two feet. Field contracted to a small area around fixation-point. Some supra-orbital pain. I found the conjunctiva slightly injected; anterior chamber of normal depth. Pupil dilated ad maximum. Ophthalmoscope shows humors clear; fundus distinctly seen; no venous pulsation, T.$= +1$? No complaint made of O. D., the refraction of which was determined with considerable certainty. The glass selected, $+\frac{1}{6}\frac{1}{0} \supset +\frac{1}{1}\frac{1}{2}$, c. ax. vertical, gave V$=\frac{15}{XX}$? Eserine directed to be used in both eyes.

July 20th.—O. D. V. fallen to $\frac{15}{XXX}$ with correcting-glass; O. S. V$=\frac{6}{6}$; with $+\frac{1}{6}\frac{1}{0}=\frac{6}{LXX}$. Field not taken.

July 23d.—O. D. V. sunk to $\frac{15}{LXX}$, even with correcting-glass. Oph-

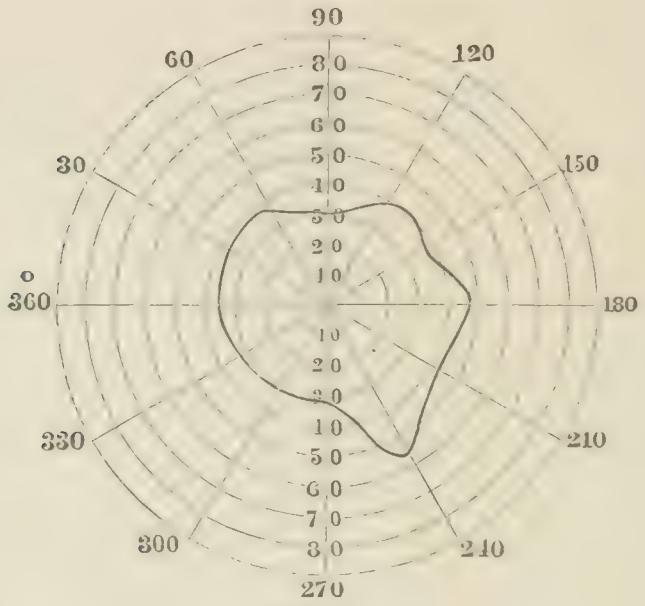


FIG. 1.

thalmoscope shows fundus clearly. Field irregularly contracted. (See Fig. 1.)

O. S. V=$\frac{1.0}{c}$, Jr. No. 6, with +$\frac{1}{20}$, read at 10″; pupil of nor-

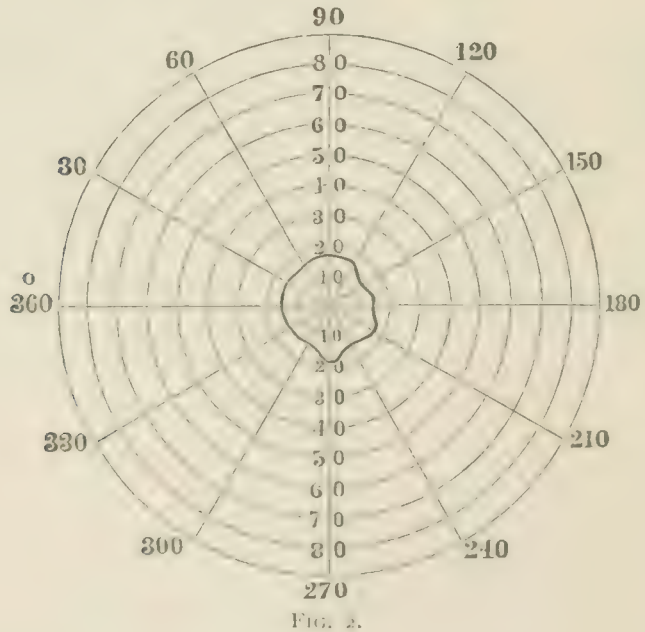


FIG. 2.

mal size, active under light and shade. Field embraces about 15° around fixation-point. (See Fig. 2.)

July 27th.—O. D. V=$\frac{1.5}{LX}$; slight increase of field.

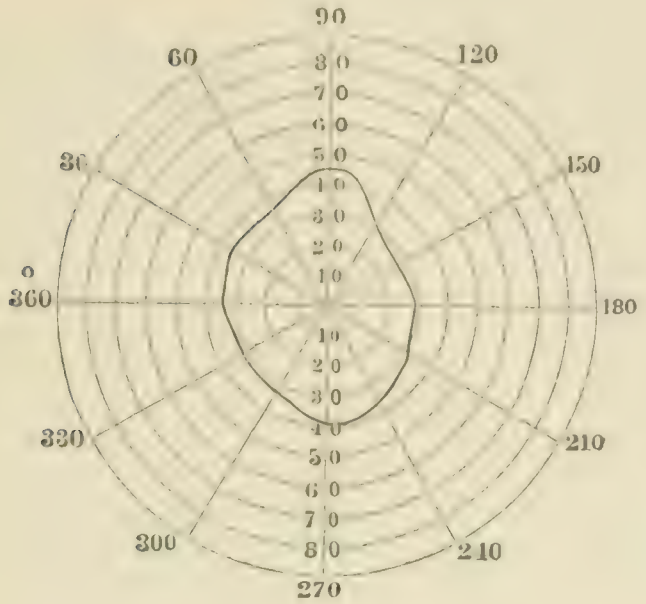


Fig. 3.

O. S. $V=\frac{15}{LXX}$? Slight increase of field. (See Fig. 3.) Some supra-orbital pain.

July 30th.—O. D. $V=\frac{15}{XX}$? On this date, contraction of field slight and symmetrical, being narrowed about 10° on all sides.

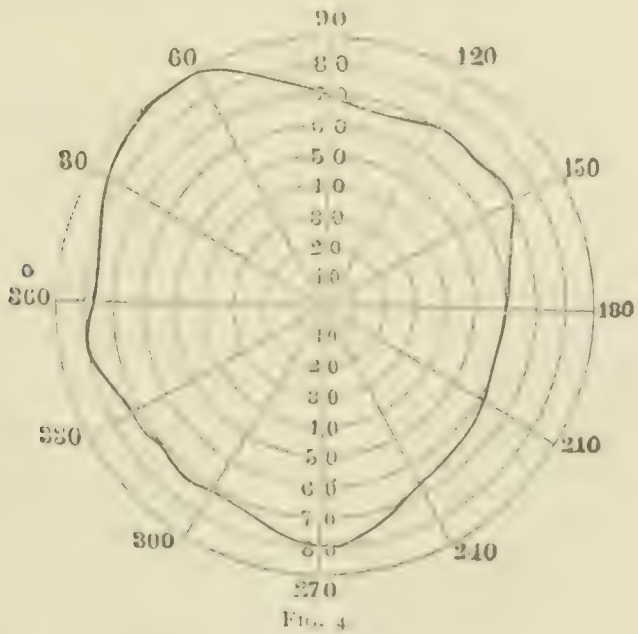


Fig. 4.

O. S. $\frac{15}{LXX}$. Pain in supra-orbital region.

August 3d.—O. D. $V=\frac{15}{XX}$ with correcting-glass.

O. S. V=$\frac{15}{XXX}$ with $\frac{1}{12}$ cyl. ax. vert.

From this date the improvement was continuous, so that on August 27th, at which time right field was normal, and that of O. S. nearly so. (See Fig. 4.) Glasses were ordered to correct her refraction, with which O. D. had acuity of $\frac{15}{XV}$, and O. S. of $\frac{15}{XX}$.

The accompanying diagrams give dimensions of the left field at different dates, showing the extreme degree of constriction on July 23d up to that of August 27th, when it had attained its maximum size. One illustration is also given of the right field. The dimensions of this field ultimately became normal. No regular mention has been made of the tension, as the increase, if any, was almost imperceptible—might be, perhaps, +1?

An examination on March 3, 1881, revealed the fact that the eyes had remained as at the close of the above record.

This case dispels any hope which may have been entertained that in dubosia we have a remedy, the use of which is free from the dangers that attend the employment of atropia. The case has had to me additional significance, as being one in which the surgeon might readily be pardoned for the use of the remedy, as neither the symptoms of the case, the condition of the eye, nor the age of the patient, were calculated to warn him of such a possible result as here attended the use of the drug in question.

INTERMITTENT CONCOMITANT CONVERGENT STRABISMUS.

By G. C. HARLAN, M.D.,

PHILADELPHIA, PA.

A VERY marked case of this peculiar form of squint has been under my observation for several years. I have nothing to offer in elucidation of the obscure pathology of this rather rare affection, but simply put it on record.

The patient is a bright little boy, the son of a physician, and when the squint first appeared was three years of age, and in good health. His father was in the habit of taking him out to drive daily, and he was occasionally aroused for this purpose from his afternoon nap. His mother noticed that he frequently awoke on these occasions with a decided squint of the left eye. When the drives were given up on account of the approach of winter, the squint occurred on waking in the morning, and was soon observed to be regularly intermittent in the tertiary type. One day the eyes would appear perfectly straight, and on the next there would be a strabismus of 3‴ or 4,‴ which would continue until bedtime. Though the origin and course of the affection were not at all those of hypermetropic strabismus, the refraction was frequently and carefully tested by the ophthalmoscope, under atropia, and seemed to me to be nearly, if not quite, emmetropic. As another ophthalmic surgeon, who saw the case, thought there was a low degree of hypermetropia, convex glasses were faithfully and constantly worn for many weeks, but without the slightest effect. The most anxious and constant watching failed to reveal any source of cerebral or nervous irritation, and the case was finally left to nature. The regularity of intermission continued, with great exactness, for rather more than a year, when it was suddenly broken up by the occurrence of the squint on an "off day," and has not since returned. The squint became the rule and the intermissions irregular, and less and less frequent. At the present time, three years after its commencement, the squint is practically constant, with

only very rare and doubtful intermissions, though it varies in degree within very wide limits, and without any reference to the use of the eyes.

REMARKS.

THE PRESIDENT directed attention to the form of strabismus occurring in chorea, and as the choreic symptoms subsided, the strabismus disappeared. The question might arise, whether or not the essence of the disease did not exist in some choreic disturbance.

DR. HARLAN said that the fact spoken of by the President was taken into consideration, but no evidence of chorea could be found by a careful tracing of the clinical history.

A CASE OF HEMORRHAGE NEAR THE MACULA LUTEA, FROM CONCUSSION.

BY DANIEL B. ST. JOHN ROOSA, M.D.,

NEW YORK.

I DESIRE to report a case of what I consider to be a hemorrhagic, or exudative process, involving the macula, caused by concussion of the retina or choroid, or both, from a bullet. A young man, who was engaged in marking a target for rifle-practice, looked out from behind his shield during the firing, and was hit over the right lachrymal sac by a bullet. On examination by Dr. Rankin, of Newport, a few hours after the accident, the eye was found closed and the conjunctiva very much swelled. The course of the ball was plainly made out, as it can be to-day. It passed downward under the skin, to the side of the lower part of the nose, where it turned and passed beneath the muscles of the cheek to the point of lodgement, about one-fourth inch below the glenoid fossa, where it can be plainly felt. This accident occurred on April 5th, and he was sent to me in July, by Dr. Rankin, on account of loss of vision in the eye of that side. The patient states that he could see quite, if not perfectly well, immediately after the accident. Four weeks after the accident he found that his vision on fixation was impaired. He could no longer sight a gun with the affected eye. His vision is now $\frac{1}{2}\frac{6}{0}\frac{6}{0}$, but there is a central scotoma. On the other side it is $\frac{2}{3}\frac{0}{0}$. The refraction is myopic. On the use of prisms crossed double images are brought out. By the ophthalmoscope the media are found to be clear, but just below and involving a part of the macula there is a red patch with displaced pigment about it. The eye has completely recovered from

the external inflammation following the injury. The upper jaw is still tender at the point from which the ball turned to go under the ear. The patient was seen by me several times during the months of July and August. The vision decreased somewhat; the macula underwent some change; the hemorrhagic spot became yellow, atrophic; the double images remained the same. It appears that the eye-ball was merely grazed by the bullet, and that the damage to the retina or choroid, or both, was due to concussion. The insufficiency or paresis of the internal rectus may have been an old affair, an incident of the myopia.

REMARKS.

Dr. O. F. Wadsworth, of Boston, said that Dr. Roosa's case reminded him of one where a man was struck upon the right side of the nose with a chisel, which was said to have entered half an inch or more, and was then drawn out, and there was a scar in that locality. The man was knocked down by the blow, but stated that he did not lose consciousness. He got up, walked into a room upstairs, and after a time was taken home from the shop. He was kept in bed for some time, and there were no special cerebral symptoms; but the eye on the opposite side—the left eye—had lost its sight apparently. He was unable to lift the lid, and was seen by an oculist on the same day, who was unable to determine what was the patient's exact condition. The ability to lift the left eyelid returned slowly, and since Dr. Wadsworth first saw him, the movements of the eyeball had been restored; but there was still complete anæsthesia of the cornea, largely of the conjunctiva, no vision, atrophic condition of the optic nerve, and what appeared like a very narrow rupture of the choroid. The cornea was not absolutely clear, but sufficiently so to show distinct atrophy of the optic nerve. On the side of the injury the eye was good. He supposed that such cases could be explained, as Berlin had explained loss of vision after gunshot wounds, by injury in the foramen.

The wound was upon the right side, and the ocular symptoms were confined entirely to the left eye.

Dr. G. Hay, of Boston, asked Dr. Wadsworth how he knew that the chisel did not go into the left orbit.

Dr. Wadsworth answered that there was nothing to show that the tool penetrated the left orbit. There was some bleeding from the nose at the time of the injury, and the sense of smell was lost for some time, but that returned.

The President remarked that there were some interesting facts concerning injury to the orbit by the extension of fissures through the optic foramina, which had been set forth by Berlin, and that the lesion was a frequent attendant upon fractures at the base of the skull. He remembered to have seen a man who was struck upon the side of the head, had no injury at the site of the blow, but there was atrophy of the optic nerve upon the opposite side.

OPTICO-CILIARY NEUROTOMY.

BY O. F. WADSWORTH, M.D.,

BOSTON, MASS.

THE operation of optico-ciliary neurotomy is yet far from having attained a definite and fixed position in ocular surgery. It still has strong opponents and warm defenders, and while, perhaps, no one would now give it so extended an application as Schoeler at first claimed for it, whether it will retain a permanent place as an effective and valuable method in a more or less extensive class of cases, or whether it will eventually be generally abandoned, can be considered by no means positively settled. It is with the hope of contributing in some degree to the solution of this question that I report fifteen cases in which I have performed the operation. Though two of these are so recent as to be of no importance as regards the eventual effect produced, others I have been able to follow for periods sufficiently long to make them of value in this respect—from five to thirty-two months.

CASE I.—W. S., forty years of age, boot-black. In 1865, a cataract was removed from the left eye, but after two years the sight failed, and in the course of some months the eye became useless. In 1868, cataract removed from right eye. The left was quiet till Sept., 1878, then became red and tender in upper ciliary region, with photophobia. He was treated at the Eye and Ear Infirmary; the unpleasant symptoms passed off, and near the end of October he resumed work. But, after working a week, photophobia and redness of the left returned, and three or four days later, November 7, 1878, he came to me. Left: there was moderate circumcorneal congestion; tenderness in upper ciliary region; clear cornea; coloboma upward; capsule stretching from the cicatrix above downward to behind iris, leaving a clear opening more than 1''' in diameter; no reflex from fundus; no perception of light. Right: large coloboma upward; some capsule at lower and inner sides of pupil; moderate photophobia. Atropine L. and rest. Two days later he saw sparks before the R. on exposure to light.

November 11th.—Neurotomy.—Two sutures were placed in the internal rectus; its tendon was divided, and Tenon's capsule widely opened; dissection with scissors back to opticus, which was divided close to the globe. A little further dissection about the opticus allowed its stump to be rolled forward into a central position in front, and all attachments in a wide region around it were severed, including the insertion of the inferior oblique and some of the venæ vorticosæ. The eye was replaced, the internal rectus tendon sutured, and a compressive bandage applied.

There was considerable exophthalmos immediately after the operation, which was slightly increased at the end of twenty four hours, and then gradually decreased. The bandage was continued for ten days, and then iced compresses were applied during four or five days. Chemosis of conjunctiva was marked for some time, and it was two weeks and a half before it had disappeared. A week after the operation there was a small amount of blood at the bottom of the anterior chamber, and on the thirteenth day, after the head had been held in an inclined position, a clot $\frac{3}{4}'''$ high. This was nearly absorbed two days later. Morph. sulph., $\frac{1}{4}$ gr., was given the night after the operation, more on account of headache from the ether than from pain about the eye, and for two nights afterward chloral, xv. grs.

The cornea was completely anæsthetic. The man returned to his usual occupation in three weeks.

There was still a little congestion at the inner side of the cornea at the end of two months. A divergence of about $1'''$ persisted. Movement inward was not quite as extensive as of the other eye, in other directions normal.

There has never been any discomfort in the eye since. The tension soon became decidedly diminished, and in the course of a year the iris atrophied somewhat and the eye became a little smaller, but has scarcely changed in size now for a year and a half.

For three or four months the cornea retained its transparency, and then its lower part became gradually opaque in the anterior layers, and a whitish membrane began to form across the pupil.

July 19, 1881.—A membrane closes pupil and coloboma; the anterior layers of the lower two thirds of the cornea are opaque. The cornea is still wholly anæsthetic.[1]

CASE II.—M. J. T., fifty-two years of age, laborer, received a wound of the left eye from a piece of stone, in December, 1877, for

[1] December 27, 1881, condition unchanged.

which he was under treatment three weeks, the eye then becoming quiet. January 15, 1879, he entered the City Hospital, stating that the injured eye had been increasing in size for six months, and had been painful for two months, while of late, sight in the right eye was beginning to be impaired. The left cornea was wholly opaque and markedly staphylomatous.

January 17th.—Neurotomy: the operation as in the previous case, except that there was only one suture placed in the internal rectus. Exophthalmos immediately after the operation not very great. Bandage. During the following night the man started up from his bed and moved about the ward shouting "Murder." The next day exophthalmos was greater, the lower lid rolled inward, and the globe exposed over a space some two-thirds the height of the cornea. The exposed parts of the conjunctiva were chemosed. On the 20th, chemosis less; some superficial ulceration of cornea. Bandage omitted.

From this time the exophthalmos decreased; the ulceration was stationary for a few days, and then healed; the staphyloma slowly became larger. Cornea anæsthetic.

February 1st.—Paracentesis of cornea. The cornea collapsed, but in two days had again become prominent; the paracentesis was repeated every two to four days till March 10th, when the man left the hospital.

May 17th.—He entered the hospital again with Bright's disease. The eye had been free from pain; the cornea was still anæsthetic, but quite prominent. During his six weeks' stay in the hospital, Dr. Williams saw him, and twice slit the cornea across nearly its whole width. Both times the extensive wound healed without difficulty. He has not been heard from again.[1]

CASE III.—W. G. M., forty-eight years of age, wood-turner; entered the City Hospital, January 24, 1879. Two months before his right eye was struck by a piece of fishing-rod, and he had since suffered from severe pain and photophobia.

January 27th.—R., an irregular cicatrix at the inner side of the cornea, to which the iris was drawn over and attached; scarce any anterior chamber; bulbar conjunctiva thickened and congested; no V.; L., great photophobia; moderate conjunctival congestion; cornea and iris normal. Neurotomy; moderate exophthalmos; both eyes bandaged.

On removing the bandage the next day, the photophobia had disap-

[1] Died in the spring of 1880.

peared. Iced compresses were substituted for the bandage after forty-eight hours.

February 12th.—He went home to Vermont with clear and anæsthetic cornea, still some congestion and swelling of conjunctiva at the inner side. Shortly after his return home there was a temporary inflammation of the right eye, which appears to have been a conjunctivitis. A few months later I saw him, and he said the eye had been free from pain, as it was then. Cornea still anæsthetic.

His employer informed me that M. died in March, 1881, of inflammation of the bowels. The eye had always been quiet.

CASE IV.—M. McS., twenty-one years of age, entered the Massachusetts General Hospital, January 31, 1879, for acute articular rheumatism. His left eye was then blind. On February 5th, this eye inflamed, and on the 8th I saw him. There was iritis; complete occlusion of pupil; bulging of iris; severe pain; no perception of light. During the next fortnight his general symptoms were very much relieved, but the inflammation and pain of the eye continued, and the iris bulged more, here and there touching the cornea.

February 18th.—Neurotomy; back of globe cleared from all attachments over a wide circle about opticus. The insertion of inferior oblique divided in this, as in all cases; whether the superior oblique was detached, I am not sure, as no note was made of this at the time. The hemorrhage was not great, nor was there a very large amount of exophthalmos. Pain ceased immediately after the operation, and there was only the usual tenderness for two or three days over the wound.

March 18th.—He left the hospital with the eye freely movable in all directions, standing slightly higher than the right, but with no apparent divergence. Cornea clear and anæsthetic.

After leaving the hospital he worked on a farm, and for four weeks was free from pain. During the next month, however, he had four or five attacks of pain, always confined to the eye itself, usually coming on during sleep, and never lasting so long as twenty-four hours. He had also felt pain in the eye when jarred, as by the fall of a heavy cover, not from lifting.

May 15th.—He came to the hospital during one of these attacks. There was general congestion of the bulbar conjunctiva and a little deep congestion. The cornea was clear and anæsthetic, except close to the limbus. The discolored iris no longer bulged forward as before neurotomy, but stretched across the bottom of a fairly deep anterior chamber, its centre being the most prominent part. T.

diminished. Considerable tenderness to pressure in upper and outer ciliary region. Atropine seemed to have no influence on the pain. Hot fomentations advised.

May 20th.—He reported that the pain ceased during the night of the 15th, but returned on the 18th suddenly, and lasted some thirty hours. Now, considerable congestion, tenderness to pressure as on 15th, but less; cornea still insensible. Complains of a dull ache in right eye. Enucleation. Capsule much more closely attached to globe than normally, especially at inner side, the back of the globe attached to the tissues of the orbit by firm, dense tissue over a space some half inch in diameter. He left the hospital in two days, free from pain. I have not heard from him since.

The eye was placed immediately in Müller's fluid and examined later. The retina was completely detached, and stretched forward from the nerve-entrance in the form of a small cord; the choroid everywhere in place. The posterior third of the eye was removed, and the choroid carefully lifted up; the ciliary nerves in their course along the inner surface of the sclera were much smaller and thinner than normal; teased, and examined under the microscope, they appeared to consist simply of the sheaths of Schwann, with their nuclei; no trace of myeline, and nothing that might pass for an axis-cylinder, could be discovered.

CASE V.—W. S., aged forty-one, laborer; entered City Hospital, February 14, 1879. Ten months before he had been kicked on the right eye by a horse. Sight failed soon after. For the last three months, right eye inflamed and painful, and the last month left eye sensitive also. Right, moderate congestion; cataract; pupil fastened to lens, except upward and outward; no V. Neurotomy. Bandage three days; then cold compresses. He left the hospital, March 5th, with some conjunctival congestion; cornea clear and anæsthetic; slight divergence. He has been seen from time to time since, and has had no inconvenience aside from occasional conjunctivitis of either eye, of small amount. July 20, 1881, the cornea perfectly transparent; anæsthetic everywhere; tension diminished; no shrinking; lens partly cretaceous, shaking a little with movements of eye; iris shrunken upward and outward, where not fastened to lens.[1]

CASE VI.—T. S., aged forty-five, laborer; came to the Massachusetts General Hospital, September 2, 1879. Six years before he had received a blow on the left eye, and since had been able to work only about half

[1] December 25, 1881, condition unchanged.

of the time, the eye being free from pain for a few months, and again for some months so painful as to keep him idle. He had now been unable to work for more than three months, and had lost flesh and strength from pain. The left eye was congested, shrunken, with indentation from superior rectus; cornea fairly clear, smaller than the other, containing some vessels; edge of pupil nearly everywhere fastened to opaque lens; tenderness to pressure on upper and outer ciliary region. He complained of weakness of the right eye also. Both the patient and his wife refused enucleation positively, but acceded to a proposed neurotomy. The operation was from the inner side, and presented no peculiarity, except that there was generally a much more intimate connection between Tenon's capsule and globe than normal. The bleeding was not excessive, but the amount of exophthalmos, immediately after the operation, was more than usual. The following day the exophthalmos was greater; the bandage was omitted, and iced compresses applied. For two days longer the general swelling of the orbital tissues was great and tense, and I feared phlegmon of the orbit.

Comparatively little pain was complained of, however, and by September 8th, six days after operation, the inflammation had much subsided, and the patient was very comfortable. He left the hospital September 18th.

He reported several times at intervals, the last time in March, 1880. The eye was quite comfortable; he said that only when he took cold did he have a little sting in it, "not enough to mind." There was then, and had been, some pain on *considerable* pressure in upper and outer ciliary region, but this pain was not great, and seemed gradually lessening. The eye was smaller than before neurotomy; the cornea contained a number of vessels in its tissue, and was moderately sensitive.

[NOTE.—The man was seen on October 16, 1881. He had had no pain or uneasiness in the eye since March, 1880. The eye was much shrunken, quite hard, feeling as if it might contain bone; the cornea about 3‴ in diameter, cloudy, moderately sensitive; no pain from firm pressure on any part of the eye.]

CASE VII.—G. D. G., aged 22, painter; entered City Hospital, February 9, 1880. Lost sight of left eye when three years old. Three years ago this eye was red and painful for a time. One year ago it again became painful and continued so for three months, the pain being enough to prevent sleep. The last three months it had been painful, mostly at night. R., not affected. L., a horizon-

tal cicatrix at inner side of cornea, which is otherwise clear; pupil drawn far to inner side behind cicatrix, very small; iris a little changed in color; scarcely congestion; some tenderness; some divergence.

Neurotomy. Two sutures in internal rectus to correct divergence. He left the hospital February 18th; cornea anæsthetic.

July 13, 1881.—Patient has been seen at long intervals. There has been no shrinking. Cornea still transparent. There is capability of distinguishing touch over the whole cornea, but no feeling of discomfort even with considerable pressure with a probe, nor sign of shrinking, as there is when the R. cornea is touched never so lightly. No tenderness in ciliary region. T. lessened. Iris and pupil as before operation. Slight convergence.[1]

CASE VIII.—L. H., a girl, aged eight; was struck in the R. eye by the horn of a cow, in July, 1879. In November she began to have pain in the L. eye, and was confined to bed for a month. I saw her January 19, 1880. There was decided photophobia. R., moderate congestion; globe much shrunken; cornea 3‴ in diameter; a cicatrix in sclera upward and inward, concentric with corneal edge, nearly ½″ long, in part dark and projecting; no tenderness to pressure. L., little congestion; pupil quite small and irregular, and closed by gray membrane. She had recently made a long journey from the West, and was still tired; but, with tonics, rest, and atropine to the L. eye, her general condition improved rapidly. January 26th, counted fingers at 3′ L.

February 1st.—R., tender to touch, and a little congested. L., little congested; fingers, 6′–7′.

Neurotomy. R.—Free opening of capsule, opticus and tendons of both obliqui divided, and back of globe well bared. Hemorrhage not excessive, though face much congested from ether, and ceased as soon as the division of attachments allowed the back of the eye to be rolled forward. Bandage removed after forty-eight hours. No pain; no ecchymosis of lids; very little swelling. The catgut suture had not held, and there was considerable eversion.

February 8th.—L., fingers at 10′.

A fortnight later she struck the outer angle of the L. eye against a table, and although she did not complain of pain, there was on the 26th more congestion of this eye, and she counted fingers only at 5′–6′.

[1] December 9, 1881, condition unchanged. A very light touch with the torn end of a bit of paper is not always perceived.

The congestion passed away, but sight still decreased a little during the next six weeks.

April 10th.—Iridectomy was attempted; the iris tore and bled freely; the small opening made soon closed, and there was no improvement of vision.

June, 1881.—The R. has remained free from tenderness or pain. She can no longer count fingers with the L.

CASE IX.—K. B., aged twenty-three; entered City Hospital, August 30, 1880. The sight of the right eye had been lost for a long time. For eight weeks she had had pain in and about it, for which she had been obliged to take morphia daily. R., considerably shrunken, tender to pressure; cornea containing vessels. L., cloudy opacities of cornea. Photophobia.

Neurotomy.—Four or five days later she had an attack of diarrhœa, which weakened her much. September 27th she left the hospital. The globe small and soft; tenderness much less; the vascular cornea sensitive.

March 16, 1881.—The globe has shrunken more; the cornea is two-thirds the diameter of the other, vascular, sensitive. She complains of pain and tenderness, but bears considerable pressure without noticing it when her attention is distracted. Declines enucleation.

July 11, 1881.—Still complains of pain and tenderness, but the pain is dull, in the brows—not more on one side than the other. She has been obliged to sew for her livelihood, and has quite imperfect sight in the left eye; is anæmic and weak; and it seems probable that a large part of the pain complained of is caused by overwork of this poor eye. She is unwilling to have the eye touched, and it is, therefore, impossible to determine whether there be really tenderness. Refuses enucleation.[1]

CASE X.—J. D., aged eleven, school-boy. When four years old, the right eye was struck by a piece of slate, and its sight lost. Early in the fall of 1880 this eye began to feel heavy and painful whenever he read much, and he was obliged to leave school. Then the eye ceased to trouble him for a time, but in January, 1881, he again had pain in this, and in the left eye also, from reading.

[1] December 5, 1881.—The eye is quite free from congestion; not smaller than in March; soft; not tender to pressure on the ciliary region; cornea less vascular, but sensitive. The patient now states that she has had no pain in the right eye since four or five months after the neurotomy, but that she has some dull aching above the left eye after using it for a time.

January 24, 1881.—Admitted to the City Hospital. Right eye smaller; its cornea three-fourths the diameter of the left. A cicatrix, to which the iris is fastened, runs diagonally across the cornea and extends a little into the sclera. A little sensitiveness to pressure. The cornea contains a few vessels. Neurotomy. Discharged "well" February 2d. No note was made in the record of the state of the eye on that date, but the cornea was not anæsthetic.

[NOTE.—September 30, 1881.—Has been employed as errand-boy since leaving the hospital. The eye has been free from pain, and he has been able to read without trouble. Globe nearly free from congestion, although there is a moderate trachomatous affection of both lower lids; cornea generally clear, but containing a few fine vessels, its sensibility greatly diminished, not wholly anæsthetic; no tenderness to pressure; no further shrinking; —T.]

CASE XI.—R. M. G., aged eleven, school-boy. Admitted to City Hospital, February 2, 1881. In August, 1881, right eye struck by a stone; under treatment at the Eye and Ear Infirmary six weeks; since, unable to attend school because reading causes pain in the eyes. Right cornea somewhat irregular in outline, contains many fine vessels. A horizontal cicatrix extends more than half across the cornea, and 2‴ into the sclera at the inner side. The thinned and discolored iris is fastened to the cicatrix, and above is separated for a short distance from its ciliary attachment. Little tenderness; sees movement of hand against the light. Neurotomy.

February 24th.—Discharged. Corneal sensibility lessened, not lost. He returned to school from the hospital, and had no further difficulty in studying.

July 18, 1881.—He came to the out-patient department with a catarrhal conjunctivitis of the right eye, which passed off under treatment. The cornea contained fine vessels, except in a small space half way between the scar and the lower edge. This free space was anæsthetic. Elsewhere there was sensitiveness, but decidedly less than that of the left cornea. —T. No tenderness.

CASE XII.—J. M. J., aged eleven, school-boy. In December, 1880, he received a blow on the right eye from a stick. The eye was painful for some two weeks, then became quiet. Early in February, 1881, however, he began to have pain in it again on attempting to read or study.

An irregular cicatrix ran from the inner edge of the cornea nearly to its outer edge. To this the discolored and stretched iris was fastened. Moderate congestion; no special tenderness; bare per-

ception of light. He was treated as an out patient at the City Hospital for a few days, without relief.

On February 17th, he stated that he had pain the night before in the left eye also. He was taken into the hospital and neurotomy performed. No pain after operation.

March 2d.—Discharged. The cornea clear, except at the cicatrix, anæsthetic.

[NOTE. — August 13, 1881.—The boy was at school after leaving the hospital, till vacation, at the end of June, and had no trouble. Now, divergence $1\frac{1}{2}'''$; no congestion; cornea (except cicatrix) clear, anæsthetic except close to the limbus; iris looks better; —T.; no tenderness.[1]]

CASE XIII.—T. C., a boy, six years and nine months of age, was seen in consultation, December 12, 1880. Two weeks before he had cut his right eye while whittling. He complained little at the time, but after two or three days had photophobia, pain in brow, etc. For five days he had had atropine and bandage. There was moderate congestion; cicatrix of cornea from its outer edge to near centre; iris attached to cicatrix and bulging forward at its inner and upper part; pupil $1\frac{1}{2}'''$, irregular, with grayish reflex. So much photophobia as to prevent accurate examination of L., which, however, except for slight congestion, appeared normal. The father was strongly warned of the danger of sympathetic ophthalmia, but it was only on March 8, 1881, that I saw him again. Meanwhile he had had much photophobia, and been kept in a darkened room.

March 10th—Moderate congestion; cornea clear, except for linear cicatrix; iris attached to cicatrix, and everywhere bulging forward nearly to cornea; globe soft. Neurotomy. Division of internal rectus, of inferior, and most of insertion of superior oblique. Opticus cut short; back of globe cleaned well toward equator. Moderate bleeding; no exophthalmos; two sutures. The day after operation photophobia had disappeared, and he made no complaint afterward. His mother was so anxious about him, however, that he was allowed to go out but little for more than a month, and then only with a shade or bandage over the eye, although he did not wish it. Even in May, when I saw him last, he had been watched over so closely that he was much afraid of having anything done, and I could not test the sensitiveness of the cornea. There was still a

[1] December 27, 1881, condition unchanged.

button of granulations at the site of the conjunctival wound, which kept up some congestion at that part.

[NOTE.—October 1, 1881.—The boy's mother states that the granulations at the inner side of the cornea disappeared early in June. He never complains of the eye, and has no trouble at school. The eye is generally pale, but reddens when he gets much heated while playing out of doors, the redness passing off readily. Scar in cornea less marked; cornea transparent generally, one or two vessels running into it from the lower edge; a little below the cicatrix a faint grayish line, slightly uneven and elevated, runs partly across the cornea—a scratch of the epithelium. There is little, if any, sensibility of the cornea. The iris no longer bulging, but anterior chamber shallow. Globe soft, of the same size as when operated on.]

CASE XIV.—J. S., thirty-two years of age, stone-cutter; was struck on the left eye by a rope, in the summer of 1880. The eye was very painful for some two weeks. Afterward he noticed no defect till about the first of May, 1881, when the sight of this eye began to fail, accompanied by dull pain in the brow and temple. July 1st, I saw him at the City Hospital. He had been using atropine for a time without relief. The left eye was moderately congested; cornea clear; iris turbid and much discolored; pupil free and of fair size; lens cataractous. There was no marked tenderness. He counted fingers at 2′. He complained that for six weeks he had been able to use the right eye for a short time only, and it was becoming weaker. Vision was normal in the right eye, but its accommodation decidedly below the norm.

July 8th.—Neurotomy. Both obliqui divided and posterior half of globe cleared. Hemorrhage and exophthalmos moderate. He left the hospital July 11th, and returned to his work on the 19th, but was unable to continue at it because of inability to judge well differences of level. July 25th, when last seen, the cornea was anæsthetic; the eye freely movable; no pain or discomfort. Atropine did not affect the pupil.

CASE XV.—D. H., aged 40. In April, 1880, a piece of iron entered his left eye; pain and photophobia four months, then the eye became quiet. Early in 1881 pain returned, and June 6th he presented himself to Dr. Williams, at the City Hospital. A point of metal was visible near the lower edge of the cornea; an incision was made, and a splinter of iron 10 mm. long removed. He left the hospital June 13th, but returned a month later and came under my care. During this interval there had been dull pain in left eye and brow, and for

the last week, after using the right eye for an hour or two, there would come a "dull, heavy ache" in this eye also, with dimness of vision.

The left globe was somewhat shrunken, moderately congested: its cornea about two-thirds the normal diameter, partially transparent, with many vessels beneath the surface. Tenderness to pressure.

July 13th.—Neurotomy. Both obliqui divided and nearly the whole posterior half of the eye cleared. Very little exophthalmos. Three days later he left the hospital, the vascular cornea everywhere sensitive, though less than the cornea of the other eye. No special tenderness.

[NOTE.—October 16th.—Patient seen to-day. He states that during August he worked in the hay-fields in the sun, and for four weeks had a "kind of ache" about the left eye. Since then the eye has been quiet, except that once in a week or ten days there is a "heavy feel" over the left brow for a few minutes. The cornea is a little smaller than at the time of operation, vascular and sensitive. The globe rather small, hard. Pressure on the ciliary region near the scar is painful when firm; elsewhere bears even firm pressure without pain.]

In the first case the bandage was continued much longer than in any of the others, and, I believe, tended to keep up the chemosis; in the last few cases iced compresses were substituted for the bandage so soon as danger of vomiting from ether was over. There was in no case any large amount of hemorrhage; in the first few cases the precaution was taken to close the lids and make gentle pressure for a few minutes after division of the opticus, but this has not appeared necessary in the later cases.

Indeed, it has seemed that the most effective means of checking the bleeding was the thorough division of all attachments of the globe at the posterior pole of the eye; at least, I have found bleeding to rapidly cease so soon as these attachments were divided freely enough to permit the easy rolling of the stump of the opticus to the front. And it is not perhaps unreasonable to explain this on the supposition that until such division is complete the vessels are unable to retract sufficiently to enable proper closure of their cut ends.

In the case of an aged person with atheromatous arteries, the liability to troublesome hemorrhage during operation would undoubtedly be greater. I have not yet had occasion to operate in such a case. But, even under these conditions, the experience derived from

enucleation would show that the risk of hemorrhage is not enough in itself to be a counter-indication to the performance of neurotomy.

In all cases the operation has been done from the inner side, the internal rectus divided, the stump of the opticus has been brought fairly into the centre of the palpebral opening, and the sclera denuded for a wide space about it ; in all the inferior oblique has been separated from its insertion, in some the superior oblique also. Rectus reunited by suture. Usually slight divergence has resulted from the operation ; in one case, where, before operation, there was a little divergence which the patient desired to have corrected, a convergence of small amount was left. The earlier cases were retained in hospital generally longer than necessary in order the better to observe their progress ; the last two cases left the hospital at the end of three days.

Two cases only presented any large amount of exophthalmos ; the second, in which there was a prominent staphyloma, and the patient's excitement during the night after the operation probably increased the protrusion of the eye ; and the sixth. In the latter case, the exophthalmos was not so great as to prevent covering the globe by the lids ; there was no special ecchymosis to suggest excessive hemorrhage behind the eye, and the greater reaction of the orbital tissues to the operation may well have been due to the extensive adhesions which existed between capsule and sclera from previous inflammation. The ulceration of the cornea in the second case (it occurred in no other), I now think might have been avoided if the bandage had been omitted so soon as it was found the lids did not cover the globe. This same case also presents a striking illustration of the vitality of the eye remaining after so extensive a division of nerves and blood-vessels. Though the cicatricial tissue which had replaced the cornea was wholly anæsthetic after the neurotomy, yet not only the wounds of the paracentesis-needle, but slits across nearly the whole diameter of the cornea, readily united.

In Case IV. pain returned in the eye two months after the operation, with tenderness in a part of the ciliary region, but without sensibility of the cornea. It is possible that here the pain and tenderness may have been due to a rheumatic affection of the episcleral tissues —the patient had come to the hospital with articular rheumatism— it may have been, however, that a ciliary nerve, entering the eye far forward, had escaped division. Yet it might well be expected that a nerve penetrating the anterior part of the sclera would be distributed in part to the cornea, and the cornea remained anæs-

thetic. On this point the evidence is insufficient to admit a positive decision. The result of examination of the nerves entering the posterior part of the eye may fairly be regarded as evidence that there had been no reunion.

In two cases, VI. and IX., the tenderness to pressure persisted for a long time after operation, but in neither was it great; it was present too soon after the operation to be attributed to reunion of nerves, and diminished rather than increased with time.[1] In both these cases there was moderate sensibility of the cornea, but in both also the cornea was vascular. In Case IX. there was some complaint of pain, but on inquiry this was found to be in the brows, as much on one side as on the other—rather a dull ache than a pain, and seemed due to overwork of an eye with quite imperfect vision.[2]

In seven cases the cornea was transparent and free from vessels before neurotomy. In one of these, enucleation at the end of three months, for pain and tenderness in the ciliary region; cornea still anæsthetic. In three, no return of sensibility in cornea so long as they were under observation—thirty-two, twenty-nine, and six months.[3] Another case was under observation seventeen months;[4] here a touch on the cornea could be felt, but strong pressure caused no pain or discomfort, and it is possible that the touch was felt only by transmission of the impulse. In one case, XIII., there was apparently no sensibility of the cornea at the end of seven months. One, XIV., was only under observation seventeen days. Transparency was preserved in all but one of the cases.

Where the cornea was vascular, however, it always recovered its sensitiveness in part, though it became in no case so sensitive as that of the other eye. In some instances sensitiveness was probably never wholly lost at any time; certainly it was distinctly present in one case (XV.), in which both obliqui were divided and the posterior part of the globe cleared as far as the equator, three days after neurotomy, and in the others within two or three weeks. In Case VI. again, it was wholly lost for some days, at least during the height of the swelling of the orbital tissues. In some cases, observa-

[1] Later observation showed that in both these cases tenderness to pressure passed away altogether. On the other hand, in Case XV. tenderness persisted for some time.

[2] This view appears to be confirmed by the subsequent history.

[3] December, 1881. These cases have now been under observation thirty-seven, thirty-four, and ten months.

[4] December, 1881. This case has been under observation twenty-two months.

tion on this point was not so careful as to allow a positive statement whether a moderate amount of sensibility existed soon after the operation or not.

This sensitiveness of the vascular corneæ may be referred to development of nerves from the conjunctiva accompanying the vessels. That it was not due to reunion is evidenced by its early existence, and that it was not from ciliary nerves which had escaped section is shown by the fact that it was co-extensive with the vascularity. In Case XI., for instance, six months after neurotomy, the small portion of the cornea free from vessels was still anæsthetic, while in Case XV., the whole extent of the cornea being vascular, sensitiveness existed everywhere three days after operation.

The results that I have obtained in the cases above reported give encouragement to further trial of the operation, and those of some others have also been favorable. Schoeler, who first brought the operation to general notice, is, as might be expected, warmly in its favor after having performed it many times; and Schweigger, also with extended experience, says in the last edition of his handbook that, if resection of the opticus be made as he describes, the domain of enucleation may be restricted to intra ocular tumors, and in certain cases (*eventuell*) to eyes in which foreign bodies maintain a chronic inflammation, while it should be wholly rejected for cases in which pain in blind eyes is the reason for operation. Schweigger at first expressed satisfaction with simple division of the nerves. It would be of interest to know whether he now practises resection because of some lack of permanent result from division alone among his own cases, or from theoretical grounds and because of reported cases of recurrence of pain and sensibility.

Resection must, of course, diminish the chances of reunion of nerves, but must, at the same time, make the operation to some extent a more serious one, and increase the risks of hemorrhage.

But there is another side to the picture: recurrence of pain and tenderness to pressure, and return of sensitiveness in the cornea, have not been infrequently observed, and the operation has been sometimes attended, or shortly followed, by hemorrhage sufficient to necessitate enucleation, or cause destruction of an eye pushed forward so as to be unprotected by the lids. While some of these results may be without doubt attributed to an imperfect or faulty method of operation, this explanation will by no means apply to all the unsuccessful cases reported.

Aside from hemorrhage, two dangers have been chiefly insisted

on: that some of the ciliary nerves might escape section, and that subsequent reunion of nerves might take place.

As regards the first of these, it is to be noted that Cruveilhier briefly states, that two or three ciliary nerves enter the anterior part of the sclerotic beneath the recti muscles; and again, Friedrich Arnold, writing in 1831, describes the ciliary nerves as leaving the ciliary ganglion in two bundles, an upper and a lower. "One of the branches of the lower bundle, which I found constantly present, differs importantly in its course from the rest; for, immediately after its origin from the ciliary ganglion, it leaves the other branches, inclines toward the outer side, and, after a long course through the fat of the orbit, reaches the forward part of the bulb, and perforates the sclera at that point." But he does not figure this branch in his plate. Cruveilhier's statement has been many times quoted in connection with ciliary neurotomy.

Later writers on the anatomy of the ciliary nerves in man, however, so far as I am aware, with a single exception, describe these nerves as all entering the sclera around the optic nerve and not very far distant from it. Redard [1] alone states that his dissections have shown that "one, two, or three filaments belonging to the long ciliary branches perforate the sclerotic near the muscles of the eye. One of these filaments, which is encountered almost constantly, perforates the sclerotic at the level of attachment of the superior oblique muscle. Sometimes a ciliary filament is found perforating the sclerotic immediately beneath the superior rectus muscle."

If branches of the ciliary nerves do enter the sclera far forward, they must often escape division. Branches penetrating at the level of the insertion of the superior oblique muscle would indeed be severed by a dissection of the surface of the globe, reaching everywhere as far forward as the equator; but, even in so thorough a dissection as this, nerves perforating beneath the recti muscles would probably escape.

In such case, a portion of the cornea should preserve its sensibility immediately after operation, or, if the uncut nerve have yet been numbed by stretching, sensibility should return within a comparatively short time.

The weight of anatomical evidence, as already stated, is strongly against the existence of branches of ciliary nerves which enter the sclera well forward, and the clinical evidence tends in the same di-

[1] De la section des nerfs ciliaires et du nerf optique. Paris, 1879.

rection. Whenever the posterior portion of the globe has been extensively freed from its attachment, the whole cornea (provided it was not vascular) appears to have been rendered non-sensitive.

As for the reunion of the ciliary nerves, it may be urged that, from their very small size, and from the fact that they lie in loose tissues without any firm sheath to direct their course if regeneration be attempted, it is highly improbable that this should take place. Theoretical considerations, however, are not to be relied upon to settle the question. Clinical evidence must have more force, though anatomical evidence only can be sufficient positively to decide it.

It has been generally assumed that the slow return of sensibility to the cornea, with or without pain and tenderness on pressure of the globe, gives assurance that the ciliary nerves have reunited and regenerated.

Many cases have been reported in which sensibility did return, and a lesser, but not inconsiderable number in which there was pain also.

In many of these, too, the operation seems to have been done with all thoroughness and care. It is not easy to explain this result, except on the supposition of nerve-reunion.

The difficulties of the question are not diminished by the reflection that some operators have followed up cases for long periods of time, and observed no return of sensibility, while others have seen the cornea again become sensitive in all, or nearly all, of their cases which they could subsequently examine. Unfortunately, but few have given the results of continued watching of their cases. Bunge,[1] writing of fifteen neurotomies in Graefe's clinic, states that five escaped prolonged observation; one required enucleation on account of hemorrhage (hemorrhagic glaucoma); one, on the second day, for suppuration of the globe; in one case the cornea was still anæsthetic at the end of seventeen months; the remaining seven had recurrence of pain or of sensibility of cornea. Be it said, that in one of these last pain, in one pain and corneal sensibility, returned within six weeks, a period too short to admit belief in reunion.

Hirschberg[2] operated in nine cases, always thoroughly denuding the posterior half of the globe after bringing the stump of the opticus into the middle of the palpebral aperture and dividing both obliqui; but, "after one year's observation of the cases which he

[1] Klinische Beobachtungen über die sympathische Ophthalmie. Dessau, 1880.
[2] Archiv für Augenheilkunde, IX.

had the opportunity of watching, could always prove that the sensibility of the operated globe, particularly of the cornea, had returned, whenever sensibility had been present before the operation." The last clause probably refers to sensibility to pressure; he can hardly have operated on an eye with anæsthetic cornea. He does not say how many the watched cases were.

Deutschmann[1] reports on nine cases; the eye was rolled completely forward. One patient did not appear again; one left after eight days, with not wholly insensitive cornea. In the other seven sensitiveness of the cornea returned, and in two of these tenderness to pressure also.

A case published by Leber,[2] of sympathetic ophthalmia after neurotomy, is of importance. A boy of eight years received a wound from an awl through the lower edge of the cornea into the vitreous. Loss of sight, opacity of the vitreous, and injection of the eye followed. Three months later neurotomy. The boy went to his home with slightly phthisical eye, nearly free from congestion, and anæsthetic cornea. Two years and a half afterward he returned. The wounded eye was much shrunken, hard, somewhat tender to pressure about the scar, its sensibility completely restored. In the other eye dimness of vision had been noticed for six weeks, and it presented an iritis precisely of the appearance of that excited by sympathy.

The anatomical evidence of reunion is not extensive. Poncet,[3] at the International Congress at Milan, in 1880, stated that in the dog he had demonstrated all the stages of regeneration in the ciliary nerves after neurotomy, but added, "this regeneration has, however, only been shown in the extra ocular parts (central ends?) of the ciliary nerves; it is still to be sought in the ciliary plexus and in their subchoroidal course."

Two of Bunge's cases, already referred to, were examined microscopically by Kuhnt. In one of them there was complete sensibility of the cornea seven months after neurotomy; in the other, neurotomy was done three times, and finally enucleation for pain "in the orbit" and "behind the eye," the cornea being without sensation, but the ciliary body somewhat tender on pressure. In the former of these eyes Kuhnt found one ciliary nerve in a condition indicating active regeneration, in the latter were two nerves presenting similar ap-

[1] Archiv für Ophthalmogie, XXVII., 1.

[2] Ibid.

[3] Compte rendu du Congrès, etc. Annales d'Oculistique, T. LXXXIV., p. 189.

pearances. All the other ciliary nerves were completely degenerated. Kuhnt preferred to believe that in these cases the regenerating nerves had never been divided, but only injured by stretching and contusion, a conclusion which Bunge was not disposed to share.

Finally, Hirschberg reports a case of enucleation for pain and sensitiveness after two neurotomies, from the outer and the inner side, with an interval of a month, had been performed by an experienced oculist, the eye containing a long piece of iron. He states briefly: "The uveal tract and retina were detached from the thickened and folded sclera, and the space was filled with firm connective tissue. The ciliary nerves were carefully dissected out on the inner surface of the sclera, and found histologically normal." The full force of this statement can scarcely be intended, for then it would appear that, in the space of eleven months which had elapsed since the second neurotomy, all the ciliary nerves had reunited and undergone entire regeneration—a result which would seem incredible, particularly when the condition of the globe is considered.

Admitting the occasional reunion of ciliary nerves, is it necessary to assume this in every instance in which sensibility of the cornea returns? When the cornea is vascular it need not be necessary. But if the cornea be free from vessels? Writers on the nerves of the cornea agree in the assertion that these nerves are derived in part from the conjunctival nerves. Would it be venturing too much to suppose that in some cases, after division of the ciliary nerves, an increased development of the branches derived from the conjunctiva occurs?

On the other hand, it is difficult to understand how, if the corneal nerves are derived partly from the conjunctiva, the whole cornea should remain anæsthetic for a long time, or even permanently, when only a limited portion of the connection between conjunctiva and cornea has been severed by the operation.

Leber's case of sympathetic ophthalmia after neurotomy is regarded necessarily as furnishing a strong argument against the operation. It is true this is but a single case, and there have been hundreds of neurotomies, and it is, of course, *possible* that the inflammation in this case may not have been aroused by sympathy. It is also true that within a few years a number of cases have been reported, in which the first symptoms of sympathetic inflammation showed themselves days or weeks after an uncomplicated enucleation. But it is to be remembered that not very infrequently eyes have been enucleated subsequently to neurotomy, on account of symptoms which were be-

lieved to point to a condition threatening danger to their fellow eyes.

Despite all the arguments that have been brought forward against optic ciliary neurotomy, it seems to me to offer sufficient advantages to make its employment not only justifiable, but advisable in many cases.

It is yet too early in the history of the operation to define with precision in just what cases neurotomy may be substituted for enucleation with prospect of gain for the patient, and the indications of the individual case must always influence the decision.

At present I am disposed to limit its employment within somewhat narrower bounds than those proposed by Schweigger, as above quoted.

REMARKS.

DR. CHAS. J. KIPP, of Newark, N. J., asked if there was evidence of sympathetic trouble in either eye.

DR. WADSWORTH replied that there was no sympathetic trouble in the other eye, except in the eighth case, beyond sympathetic irritation.

DR. KIPP asked if there was any question with regard to the return of corneal sensitiveness.

DR. WADSWORTH replied that when the cornea was not vascular it did not return, so far as he knew, except to a slight degree in one case. In all the cases in which there was vascularity of the cornea, there was some sensitiveness of the cornea found shortly after the operation.

DR. BULLER, of Montreal, referred to a case treated some time ago, and in which he was content with partially performing the operation. An old lady had a painful cicatrix occupying the upper part of the cornea upon which vesicles formed, and the pain was intolerable while they were forming. She had been under various forms of treatment for about a year, and he treated her with every remedy of which he knew, and supposed would give her any relief. He finally recommended cutting the ciliary nerves at the upper part of the eyeball, which was accepted. There was a certain amount of vision. The operation had some effect, as the cornea was partially anæsthetic, and she seemed to receive some benefit from it for two months; but then the pain began to return, was as bad as ever, the entire cornea underwent the same process of vesication, and finally he enucleated the eyeball.

THE PRESIDENT remarked that v. Graefe had done the same thing.

DR. BULLER further remarked that he had performed neurotomy in three other cases with satisfactory results. In the last case sympathetic ophthalmia was threatening, and he performed the operation

in the usual way, there was considerable hemorrhage afterward, and there was further hemorrhage during the night; when he saw the child the next morning there was acute inflammation all around the eye, and in the course of three days the entire eye underwent purulent inflammation, the cornea broke down, and the eyeball shrank. There was suppurative panopthalmitis. It was a result which he had not seen mentioned.

DR. WADSWORTH, in answer to questions, said that he divided the inferior oblique muscle in every case—the superior oblique in some cases; that no portion of the optic nerve was removed; that the eyeball underwent atrophy to some extent in the first case in the course of a few months, but none since; that, in those cases in which the eyeball was somewhat shrunken before the operation, the shrinking continued somewhat afterward; but that the two eyes which presented the best globes and were the least affected before the operation, did not change afterward except as to diminished tension, which was present in all the cases as a permanent result.

THE PRESIDENT said that he had performed the operation perhaps five times, but not in the manner described by Dr. Wadsworth. He had divided the optic nerve by going in at the supero-internal angle of the orbit, between the rectus superior and internus, had not cut any muscle, and had usually succeeded in cutting from the nerve a piece from seven to nine millimetres in length. Consequently the operation had been a true neurectomy, but the posterior portion of the globe had been exposed, the globe rotated completely upon its axis, and every vestige of nerve and vessel cut away. He could confirm Dr. Wadsworth's statement with regard to hemorrhage. In his cases the exophthalmus had not been troublesome, and no special deformity had followed the operation. In the majority of cases it had been succeeded by marked reduction in the size of the eyeball, especially where phthisis bulbi had already set in.

In none of the cases had sympathetic irido-choroiditis declared itself, but there were symptoms of irritation. The operation was performed on account of the unpleasant prospect for the fellow-eye, caused by the irritability of the eye operated upon. His own feeling had been that the operation was of very doubtful propriety. He was very glad to have the opportunity of hearing the report of Dr. Wadsworth's cases, as perhaps it might be found that his method of operating was preferable to that employed by himself, and also by Dr. Knapp, because, inasmuch as he (Dr. W.) exposed a greater area of the posterior part of the globe, he perhaps secured a greater possibility of including all the twigs of the ciliary nerves.

THE PRESIDENT suggested that, in operating hereafter, the globe be attacked from the outer side, and that the external rectus be divided so as to come up on the outer side of the optic nerve, and that it be divided at the apex of the orbit. The reason was that the ciliary ganglion was usually situated here; and if we could get behind the origin of the nerves, there was a better chance of securing the desirable results. Hereafter he should operate on the outer side of

the globe, and should attempt to secure the ciliary ganglion. He did not think that the dangers of the operation were of material importance, and had been rather surprised in that respect. Yet he had seen sensitiveness of the cornea return when it was not vascular, and he had seen shrinking of the globe to a degree which entirely set aside the cosmetic advantages of the operation, and he had been doubtful about its ability to secure protection against sympathetic trouble in the other eye.

DR. S. D. RISLEY asked to what extent the cornea was transparent and the mobility of the eye retained.

DR. WADSWORTH answered that the mobility of the eye was good in every case, except so far as this—there was a slight diminution in the amount of fixed rotation inward. There was no large amount of divergence, except in one case, where the suture did not hold.

With regard to the return of sensitiveness in the cornea, theoretically it seemed to him more natural to suppose that it was due to reunion of the ciliary nerves than to increased growth of nerves from the conjunctiva. All writers stated that part of the nerves of the cornea were derived from the conjunctival nerves, and yet we did find that, after dividing the ciliary nerves behind the eye, the cornea was usually anæsthetic, and in his cases it remained so. But suppose sensitiveness to return, it did not seem to him unreasonable to attribute it to the increased development of the conjunctival nerves, which naturally entered the cornea. Ranvier had demonstrated, and others had repeated the experiment, that section of ciliary nerves entering the cornea, caused non-sensitiveness of the cornea in different sectors, and that the distribution seemed to be to parts radiating from the centre. But he believed that sensibility had not returned in that manner. That some of the ciliary nerves should reunite, would not be specially curious; but that all of them should reunite seemed to him to be a conclusion which should have strong anatomical proof before it was fully accepted.

THE PRESIDENT had seen cases in which sensitiveness returned over a small segment of the cornea while the remainder was non-sensitive.

DR. WADSWORTH remarked that that fact would point more to reunion, or it might be that some nerve remained undivided.

ON SOME THERAPEUTICAL APPLICATIONS OF PILOCARPINE.

BY JOHN GREEN, M.D.,

ST. LOUIS, MO.

A SOMEWHAT extended use of muriate of pilocarpine as a local application to the eye, during the past two years, has seemed to me to justify the expression of the belief that it deserves a place among our more valued remedies in ophthalmic therapeutics. The preparation which I have used is that of Merck, of Darmstadt, and I have prescribed it in aqueous solution, usually of the strength either of two grains or one grain to the ounce, to be dropped into the eye from a glass dropping-tube, which gives out a drop equal to about one-half minim for each instillation.

In asthenopia of young persons, unconnected with any considerable grade of ametropia, and in which pain or a sense of fatigue is the prominent symptom, I have for fifteen years followed the suggestion of our colleague, Dr. Ezra Dyer, to exercise the eyes systematically by reading daily for a prescribed number of minutes, and increasing the time of reading as may be found practicable.[1] Comparing my recent with my earlier experience of this very valuable plan of treatment, I feel sure that my success has been materially enhanced by conjoining with it the systematic use of pilocarpine. I prescribe a solution of the strength of two grains to the ounce, to be dropped into the eyes at bed-time, and in some cases also in the morning, at the same time giving careful instruction as to the kind and amount of eye-work, generally reading, which is to be done daily. In no case is this reading to be begun during the continuance of the primary myotic action of the pilocarpine, but only after the lapse of two or three hours if the instillation has been made in the morning, or early in the day if it has been made at bedtime. In carrying out this plan, I have had in mind to alternate the daily voluntary exercise of the accommodation with a passive exercise

[1] Dyer, in Trans. Am. Ophth. Soc., 1865.

of the parts concerned in that function, as induced by the moderate but systematic use of the myotic agent, in the belief that the organs thus passively exercised may thereby become more readily and freely responsive to the impulse of the will.

In some cases of persistent hyperæmia of the conjunctiva or of the lid-margins, predisposing to inflammatory conditions, and impeding recovery when inflammatory conditions are present, and in which the relief afforded by the wearing of judiciously selected glasses, or by the adoption of a course of treatment by mydriatics, seems to enforce the conclusion that impaired or overtaxed accommodation is an important factor in the case, I have employed pilocarpine in the same manner as in the cases of asthenopia just mentioned, and with results which have seemed to me to justify the belief that it is often a valuable adjunct to the remedies usually employed.

In cases of impairment of accommodative power, induced by causes transient in their operation, but in which the accommodative disability may continue after the exciting cause has ceased to act, the indications for myotic treatment are obvious. I have used pilocarpine with manifest advantage in cases of premature presbyopic vision, especially in hypermetropes, developed in connection with some acute illness; also in the accommodative paresis following diphtheria, and in cases of accommodative weakness of undetermined origin, but in which hypermetropia, if present, had not previously interfered with the free use of the eyes in reading or study. In these classes of cases, which are characterized rather by inability to read than by pain, and in which immediate and perfect relief is afforded by convex glasses, I have used the pilocarpine solution several times a day, but often of a strength of not more than one grain to the ounce, aiming to maintain throughout the day a moderate myotic effect, sufficient to make reading comparatively easy, but still to leave something to be accomplished by voluntary effort. Used in this way, pilocarpine has rendered me good service in a class of cases in which, formerly, I should have thought the use of convex glasses essential.

In the earliest stages of strabismus convergens, especially when the deviation is not connected with any considerable degree of hypermetropia, a continued course of myotic treatment may be indicated. In such cases the myosis should be maintained as uniformly as possible by repeating the instillation several times in the day, and, as I think, preferably by the use of pilocarpine, which is more easily manageable than eserine, and nearly free from tendency

to give rise to painful spasm of accommodation. I have as yet had no opportunity of subjecting pilocarpine to satisfactory tests in incipient strabismus: but in convergent squint, recurring after a temporarily perfect correction by tenotomy, I have used it with very positive advantage, both by itself and in connection with convex glasses.

The suggestion that an artificial myosis, continuously maintained, may have a beneficial tendency in strabismus convergens, is contained in a paper which I read before this society in 1870,[1] in which I especially advocated the free use of mydriatics in the early stages of this affection, for the purpose of fully suspending the accommodation, and so doing away with the ordinary motive to excessive convergence. The suggestions contained in that paper have been lately reproduced by a French colleague with singular exactness, but, unfortunately, with greatly exaggerated statements regarding the practical efficiency of both the mydriatic and the myotic plans of treatment. Mydriatics are now quite generally recognized as among the useful agents in the treatment of strabismus; myotics are, I believe, destined also to take a place in the same category, but one of very subsidiary importance.

In phlyctenular and vascular affections of the cornea, with photophobia as a prominent symptom, I have met with a few cases in which the usual mydriatic treatment by atropia has been attended with an increase of the trouble, and in which a change to pilocarpine has proved to be of immediate and signal benefit. I am unable to distinguish these cases by any characteristic signs from the great mass of similar cases in which atropia has rendered good service. I have used the pilocarpine solution of the strength of two grains to the ounce, beginning with from three to six instillations daily, and gradually diminishing the number as the case has progressed toward a cure. Other treatment, such as the usual applications to the tarsal conjunctiva, the use of Pagenstecher's ointment, the insufflation of dry calomel, etc., has generally been used, as has seemed to be indicated, in conjunction with the pilocarpine.

In a case of glaucoma beginning to develop in the second eye, in which the instillation of eserine sulphate (gr. ij.–℥ j.), although somewhat painful, had been attended by a positive amelioration of the symptoms, I have substituted pilocarpine instillations of the same strength, with even better effect, as marked by visual improvement, and with the advantage of complete exemption from pain.

[1] Green, in Trans. Am. Ophth. Soc., 1870.

Taken together, the good results which have followed the local use of pilocarpine in the affections mentioned have appeared to me to be of sufficient importance to encourage its more extended employment. Such testimony as I have felt justified in offering is, necessarily, of a very general character, and encumbered by a very large personal equation, which, however, no citation of individual cases would materially help to eliminate.

REMARKS.

DR. S. THEOBALD, of Baltimore, had been inclined to use pilocarpine in those cases in which eserine had been more especially recommended, inasmuch as eserine had often caused conjunctival irritation. He referred to an old case of glaucoma, in which a solution of pilocarpine—one grain to the drachm—was used for a long time with benefit, giving relief from pain.

He had also used it occasionally in corneal troubles, especially ulcers, and had always found that it produced just as soothing effect as did atropia, and the progress in some cases seemed to be more favorable than while atropia was being used.

DR. RISLEY asked concerning the pain caused by pilocarpine in comparison with that produced by a like solution of eserine.

DR. GREEN answered that the discomfort produced by pilocarpine was insignificant, certainly much less than that caused by eserine; it had never amounted to pain.

DR. THEOBALD had not seen cases in which pain had been produced by pilocarpine.

THE SO-CALLED CURE OF CATARACT BY ELECTRICITY.

BY H. D. NOYES, M.D.,

NEW YORK.

WE have already heard of the excitement created by the statement that cataract could be cured by electricity. Very much of that stir was aroused by the experience which befell one of my own patients. She fell under the care of a gentleman who promised large results from the use of electricity, and who treated her from six to nine months. She has since returned to my notice, and I am able to state the condition of things from the beginning of the use of electricity, and compare her former with her latter state.

The patient was a lady, seventy-five years of age, who had been

much worn by attendance upon her husband during a protracted illness which ended in his death. He had been blind from cataract for some time. In January, 1879, Mrs. —— asked me to examine her eyes, and I found O. D. $+24_s$, V. $= \frac{20}{100}$; O. S. $+36_s \bigcirc +60_c$, 180°; V. $= \frac{20}{40}$. Both pupils were extremely small, and, not deeming it desirable to use atropia, I saw with the ophthalmoscope in the right eye a striated and diffused opacity confined to a limited sector of the lens on the infero-external side. In the left eye a less number of striæ were found on the infero-external side of the lens. The fundus could be seen very dimly, and the choroid seemed to be pigmented more deeply than usual in the intervascular spaces. She was directed to use $+6_s$ as a reading-glass. In September, 1879, the same ocular appearances were noted, and vision was the same. The prediction was given that she was not likely to become wholly blind, but that she would have continued dimness of sight.

Soon after this she put herself in the care of a gentleman who proposed the cure of cataract by electricity. My knowledge of his proceedings is obtained from her statements. He instituted a careful hygienic regimen: in daily exercise, in requiring her to drink no other fluid than Vichy water, and to take magnesia at night several times weekly. He gave directions as to food, and used the constant galvanic current for a few minutes about the temples and eyeballs, two and three times weekly. He did not promise any hope of improvement until after six weeks. As the precursor of the happy change he said there would be a brightness over her eyes during or immediately after the galvanic seance. This phenomenon did occur to the lady, and thereupon better sight ensued. The galvanic treatment was kept up for several months, and the hygienic measures maintained. She got rid of dyspeptic symptoms, grew stronger, and improved in sight, to her own consciousness, to a marked degree. The change was in the removal of a fogginess which formerly enveloped and cast a veil over everything. She could see to read better, could recognize her friends with greater ease, and the principal gain was that she could walk the street with confidence without a guide. The improvement was real, and greatly delighted herself and her friends. But she was not restored to good vision, and the treatment was abandoned, although what had been gained was credited to the galvanism. In June, 1881, twenty-one months after my previous examination, I saw her again at my office. She was looking more brisk and cheerful than formerly, and came to my office on foot and alone, which in 1879 she would not have done.

Her vision was as follows: O. D. $+16_{,,}$ V. $=\frac{15}{15}$? O. S. $+16_{,,}$ $\frac{15}{20}$; with $+6\frac{1}{2}{}_{,,}$ reads S. 6 at 10″. Pupils very small.

About two weeks after this I used atropia and examined with the ophthalmoscope. In the right the opacity of the lens was just as it had been two years before, and in the left there was a discernible increase in its extent. But in both lenses the greater part was quite clear. The vitreous of each eye was clear, but in each there was a notable and similar lesion of the choroid and retina. This consisted in the destruction of the hexagonal pigment-epithelium and fine choroidal vessels over an area which reached from the optic disc to a point beyond the macula lutea, and was of an elliptical shape, its long axis horizontal. On this area the choroidal vessels were exposed to view, some specks of pigment-deposit were scattered over it, and its border was marked by a deep pigmentary line; the sclera was laid bare in small spots. Beyond this space no trace of the choroidal vascularity could be seen. Jaeger (*Beiträge zur Pathologie des Auges.* Taf. ix.) gives a plate of this appearance, which is a low grade of chorio-retinitis. I found that there was a central scotoma in each eye—that in dim light her sight grew suddenly and disproportionately bad. But she told me that she was no longer enveloped in the fog which was her former most distressing symptom. I found her vision apparently better than at the examination two weeks before, although she was not conscious of any change. I got the following statement: O. D. $+24_{,,}$ V. $=\frac{20}{40}$? O. S. $+24_{,,}$ V. $=\frac{20}{100}$. Evidently she had become more familiar with the type, and on this day there was bright sun in my office, while the day two weeks before was cloudy. The difference in light evidently counted very greatly in her favor.

What, now, was the true explanation of the case? Obviously there was chronic and limited choroido-retinitis and incipient cataract. Accompanying this lesion was, in the beginning, diffused haziness of the vitreous. The most important factor in the disturbance of sight had evidently been the cloudy vitreous. When this cleared up, better sight ensued, and the lens opacities were so small and so limited that they were of small detriment; but the lesion of the fundus about its central space was the chief remaining cause of the damage to vision. Galvanism had not cured nor arrested the cataracts, but the opacities of the lenses had to a slight degree advanced, as my diagrams testify. While galvanism was being used, and while rules of hygiene and dietary regulations were being skilfully enforced, the vitreous cleared up, but the choroido-retinal disease went

on. The latter lesion may be assumed to have attained its maximum within the first eighteen or twenty-four months. This includes the period from the time when I found the disease to the time when improvement of sight ceased to advance. She says that for the last year there has been no change for the better. Further comment seems needless. The claim of galvanism to cure cataract utterly falls to the ground, while it is not pretended that it cures vitreous opacity nor choroido-retinitis. It is a well-recognized fact that the lesions described undergo the above-mentioned changes and evolution. That, given the well applied measures to improve health, and the time which elapsed, just such results may be gained without any galvanism.

I have seen another case of cataract, in a man seventy-two years of age, who also had diabetes mellitus, and who submitted himself for four weeks to tri-weekly applications of the constant galvanic current. A severe attack of suppurative keratitis, with ulceration of the cornea and iritis with adhesions, was the consequence. No impression was made on the cataract. I afterward extracted the lens, which was very large and amber-colored. The opacity on the cornea, caused by the keratitis, extended over the pupil and reduced the degree of sight possible to be obtained.

PULSATING EXOPHTHALMOS.

By H. D. NOYES, M.D.,

NEW YORK.

I beg to relate a case of pulsating exophthalmos, which differs in method of treatment from any upon record. A girl, born in Ireland, had an attack of some kind of fever four years ago, by which she was kept in bed four weeks. While convalescing she was suddenly taken with a pain upon the left side of her head and about the region of the left eye, the globe began to protrude, and within one week projected to a conspicuous degree, without inflammatory disturbance. During the four years following the attack the eye remained about the same, except that she suffered from occasional attacks of fugitive inflammation. While passing through Limerick, on her way to America, she had a severe attack of inflammation, which continued on shipboard, and she was treated for granular lids. She landed in New York, and came under my observation at the Eye and Ear In

firmary. I found slight swelling of the lid, considerable chemosis, but no granular lid, and the globe protruded to a marked degree. At the inner and lower angle of the orbit there was a projection, which at first deceived me into the belief that it was a solid growth. I felt a pulsation about the mass, however, and proposed an operation for the removal of the tumor. I put the patient under the influence of ether, and it then soon turned out that the apparent tumor was a distended blood vessel, pushing forward at the inner and lower angle of the eye, and I then suspended proceedings in order to give time to decide what was best to be done. In the course of two days I put her under ether again, prepared to perform whatever operation seemed to be required. Careful examination had elicited the following symptoms: there was a long, tortuous vessel coming from the inner and lower angle of the orbit forward, and returning with a loop, and entering the orbit was what seemed to be an exceedingly large branch of the angular artery. A *bruit* was heard over the exophthalmos, but not upon the temple - distinctly heard by three persons, and not heard by two others. Pressure upon the carotid completely stopped pulsation in the enlargement, but it had no effect upon the protrusion of the globe. All this led to the belief that it was a purely vascular anomaly; and not being then willing to resort to the grave operation of ligating the carotid artery, and not making a clear diagnosis, I decided to do two things: first, to ligate the angular artery, and second, after the ligation of the vessel, to dissect down upon and trace this tortuous vessel, and tie it off. That operation I undertook, and, although it was exceedingly difficult, I finally succeeded in ligating the angular artery. Here I may say that I found the large, ordinary instruments totally inadequate to surround the vessel, and succeeded in encircling it by using a slender hook similar to a strabismus hook.

Having ligated the angular artery, I cut down upon the protruding vessel, which was as large as a medium goose-quill. I traced it down, putting on ligatures one after another, and cutting between them, and demonstrated that it was a vein, and I finally tied it at the spheno-maxillary fissure. I then had the conviction that it was the inferior orbital vein coming out from the spheno-maxillary fissure and going back into the cavernous sinus. The wound was closed, no remarkable reaction occurred, and at the expiration of six weeks all the exophthalmos had disappeared. There was no return of the pulsation, and the protrusion of the globe had been completely cured.

The diagnosis came by way of inference. I think that the pri-

mary lesion was a communication between the carotid artery and the cavernous sinus, which was followed by distention of the inferior orbital vein. My ligature must have caused a clot to form up to the cavernous sinus, and have shut up the aperture of arterio-venous communication.

Without interfering with the circulation in other directions, I succeeded in curing a pulsating exophthalmos by a local operation, which is not recorded to have been done in any of the cases collected by Sattler, who has written the last *résumé* of this subject in Graefe and Saemisch. A resort to ligation of enlarged orbital vessels has been done several times after having ligated the carotid, but in my case the cure was effected without touching the carotid. The superior orbital vein is the one usually distended in these cases, and my case must be noted as exceptional in this regard.

REMARKS.

DR. S. D. RISLEY, of Philadelphia, referred to a case of pulsating tumor of the orbit, which had an aneurismal *bruit*. The *bruit* disappeared, and the case, at present, seemed to be one of aneurism, or at least vascular tumor, which had undergone spontaneous cure. The case illustrated the difficulty, in some cases, in reaching a correct diagnosis.

DR. W. H. CARMALT, of New Haven, in this connection, referred to a case of traumatic arterio-venous aneurism between the carotid artery and the cavernous sinus, occurring in a man who had fallen from a wagon and struck upon his head. He was picked up unconscious, but recovered sufficiently to be about within fourteen days, or, as he called it, recovered his consciousness. He was then aware, for the first, of a pulsating noise upon the opposite side of his head, that lasted for about four months, when he first noticed diplopia, and subsequently there was protrusion of the eyeball. Three weeks afterward he had moderate exophthalmos, with congested conjunctiva and diplopia, due to paralysis of the external rectus alone. There was no pain, but he was conscious of this pulsation. A pulsation was found in the deep part of the orbit, and a bruit was perceptible over the eyeball and down alongside of the head and the carotid artery. His vision was perfect, as was also his accommodation. Ophthalmoscopic examination revealed only marked enlargement of veins. The fact of good vision, also diplopia due to paralysis of the external rectus alone, with propagation of the *bruit* over the carotid artery into the neck, enabled Dr. Carmalt to reach the diagnosis that the trouble was in the usual form of rupture into the cavernous sinus. By pressure upon the carotid artery, the bruit could be controlled entirely. Although at first it gave rise to slight dizziness, he did not notice it any more. He then determined to try digital compression upon the internal carotid artery, and it was kept up for twenty-four

hours by relays of nurses, during which time he heard no pulsation at all. At length one nurse failed, and during the last hour he again heard the *bruit*. The attempt was then abandoned, but renewed in the course of two or three days, in the form of intermittent digital compression, and for three days he maintained compression for ten minutes every hour. The result, however, was not very marked, only slight improvement taking place. The patient suffered actually but little, and was becoming accustomed to the *bruit* and the diplopia, and Dr. Carmalt did not feel justified in ligating the carotid artery.

DR. GEORGE C. HARLAN, of Philadelphia, some years ago reported a case somewhat similar to Dr. Carmalt's, and he carried out very much the same plan of treatment for thirty-six hours, and with a certain improvement. The man learned to make compression himself, and constructed an apparatus for that purpose, and whenever he had opportunity to apply compression he did so, and at the end of eighteen months the exophthalmos was almost entirely gone, and all annoyance from pulsation in the head had disappeared.

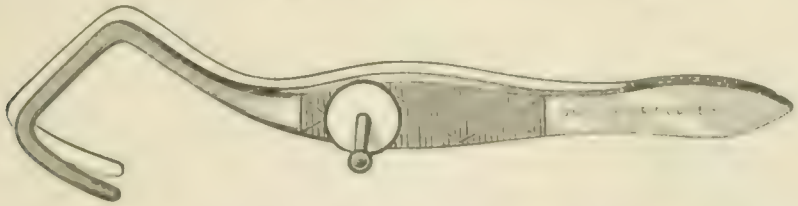
At the autopsy, finally obtained, there was no positive evidence of aneurism of the orbit.

MODIFICATION OF SNELLEN'S FORCEPS FOR ENTROPION OPERATIONS.

BY H. D. NOYES, M.D.,

NEW YORK.

A YEAR ago Dr. Green spoke of a mode of treating entropion with satisfactory results. I have found myself aided in performing that operation by using Snellen's clamp-forceps—of which both blades are made alike—for turning the lid over and holding it in the desired



position. By using this clamp you have the advantage of having the edge of the lid perfectly exposed between the blades, and the instrument offers a means of rendering the operation much less prolonged and annoying than when performed without it. This clamp has also served a good purpose in holding the reversed eyelid, during the removal of tarsal tumors, through the conjunctival surface.

Remarks.

Dr. J. S. Prout, of Brooklyn, said that he had performed the operation mentioned by Dr. Green, with very satisfactory results. Exactly how it accomplished the result he was not able to say, but he had always taken pains to evert the edge of the lid so as to make it go through the arc of a circle of 108°. In one case operated upon several years ago, where there were no ciliæ, relief followed, and there had appeared a fair row of ciliæ in each edge.

In the first operation which he performed, he found it exceedingly difficult to hold the edge of the lid in proper position, but subsequently it was much easier. He had found that a probe-pointed knife possessed special advantage over scissors for making the incision.

Dr. Green remarked that he had had a variety of experience in the use of clamps with which to hold the edge of the lid, but had finally disposed of all of them. He did not believe there was any need of clamps, and thought there was some danger in their use. At the same time the instrument exhibited might aid those who had not had much experience in performing the operation.

A PULSATING TUMOR OF THE ORBIT.

By HENRY S. SCHELL, M.D.,

PHILADELPHIA, PA.

Arthur Waterman, a farmer, aged fifty-nine, was first seen February 4, 1881. His left eye was then blind and pushed outward and downward, the lids red and swollen, the conjunctiva chemosed, and he was suffering such severe pain in the organ that the acuteness of vision in the other eye could not be determined. He stated that his present condition had lasted already for two weeks, and that for several days there had been a discharge of matter from the eye. The ball was fixed, —T. 2. At the upper inner angle of the orbit there was a slightly pulsating tumor, which gave an indistinct feeling of fluctuation upon palpation, and over the apex of which the skin was evidently attenuated.

The local pain was so severe that it was found necessary to administer an anæsthetic in order to complete the examination. After the patient was fully under the influence of ether, the pulsation of the tumor became very marked; the swelling was found to be some-

what compressible, and it became soft, and the pulsation ceased when the left common carotid was pressed upon. An exploring-needle, introduced to the depth of nearly two inches, at the most prominent part of the swelling, brought forth nothing but blood. Before the administration of ether it had not been possible, owing to the restlessness of the patient, to examine the right eye with the ophthalmoscope. The instrument was now used, however, as the patient lay unconscious, and there was found a well marked choked disc in both eyes.

From the patient's son it was now ascertained that diplopia had occurred two and a half months previously, and had remained while sight lasted in the affected eye. Also that for two or three weeks the patient had been troubled by occasional attacks of nasal hemorrhage and of nausea.

Two days after the patient was first seen his gait became tottering; he was able to walk a few steps only, and his mind commenced to wander. His pulse and temperature remained nearly normal until the last. On February 24th he became hemiplegic on the right side, and on the 26th he died.

A post-mortem examination, made the next day, disclosed a quadrate, almost globular tumor, nearly filling the left side of the anterior fossa of the cranium. It was found to be continuous at its anterior border, through a perforation of the orbital plate of the frontal bone, with a mass which filled the orbit. The dura mater covering the superior surface of the brain was thick, congested, and opalescent; the veins full of black blood, and along several of the larger ones, especially those running up from the fissure of Sylvius, was a linear deposit of whitish yellow matter, with corpuscular bodies interspersed. On the lower surface of the brain there was effusion of blood and lymph, between the arachnoid and the brain-surface. There was a small abscess, containing creamy pus, at the anterior outer portion of the left lobe. The whole interior of the anterior lobe, on the left side, was in a condition of yellow softening, which, in the region of the lateral ventricle, reached back to the middle of the brain. The cerebral substance was everywhere very vascular. When the tumor was laid open, it proved to be about the consistence and appearance of hepatized lung. A microscopic examination showed it to be a glioma. Sections of the optic nerves on both sides proved the choking of the disc to be due to interstitial neuritis, the connective tissue between the bundles of nerve-fibres being swollen to twice or thrice its normal dimensions. This was ap-

parently the result of contiguity to the tumor. Although the anterior lobe of the cerebrum, on the left side, including the third frontal convolution, was almost diffluent, the faculty of speech was preserved to the last.

A NEW TRIAL-GLASS FRAME.

PRESENTED BY S. D. RISLEY, M.D.,

PHILADELPHIA, PA.

IN the spring of this year, having occasional need in my office of a trial-frame in addition to my optometer, I directed the attention of my assistant, Dr. B. Alexander Randall, to the matter of devising one more satisfactory than those generally obtainable. Of those up to that time brought forward, none afforded a practically convenient means of accurately centring the lenses—one feature of the optometer which has proved specially valuable. As the result of his work, I present this frame as affording advantages over any that I have seen.

The requirements in the matter deserve a passing notice. The distance between the pupillary centres varies greatly, being nearly seventy millimetres in some adults, while in children old enough to be subjected to the test with trial-lenses it is often less than fifty millimetres. A movement of sixteen millimetres, at least, is therefore necessary to secure approximately accurate centring. The height of the centres is also important, and some provision should be made for its adjustment. Provision must be made for carrying two glasses, at least, in combination, while provision for a third, even if not necessary, is most convenient.

The only frame that has come under my notice, having these adjustments in any adequate degree, is one in which the semicircles for the reception of the lenses opening downward slide beneath a horizontal bar. To hold the lenses in place, a spring is necessary —a spring that is never in order, even in its best form, either too weak, or else so strong that a glass cannot be introduced or withdrawn without steadying the frame with the hand. An adjustable bridge has also been attached to the bar, but in a form that is of no real value; and, as a whole, the frame has seemed to me much too cumbersome for convenient use. The frame presented by Dr. Green at the last meeting of this society affords a centring adjustment, inadequate, however, in degree, while his frame and my op-

tometer are the only ones which I have met allowing the employment of more than two glasses in combination.

In the new frame the cumbersome bar of the frame first alluded to is replaced by a little block of truncated wedge shape, which forms the centre of the instrument. Through a rectangular mortise 3 mm. in width by 4 mm. in height, perforating this block from side to side, two narrow bars 22 mm. long slide horizontally past each

Fig. 1.

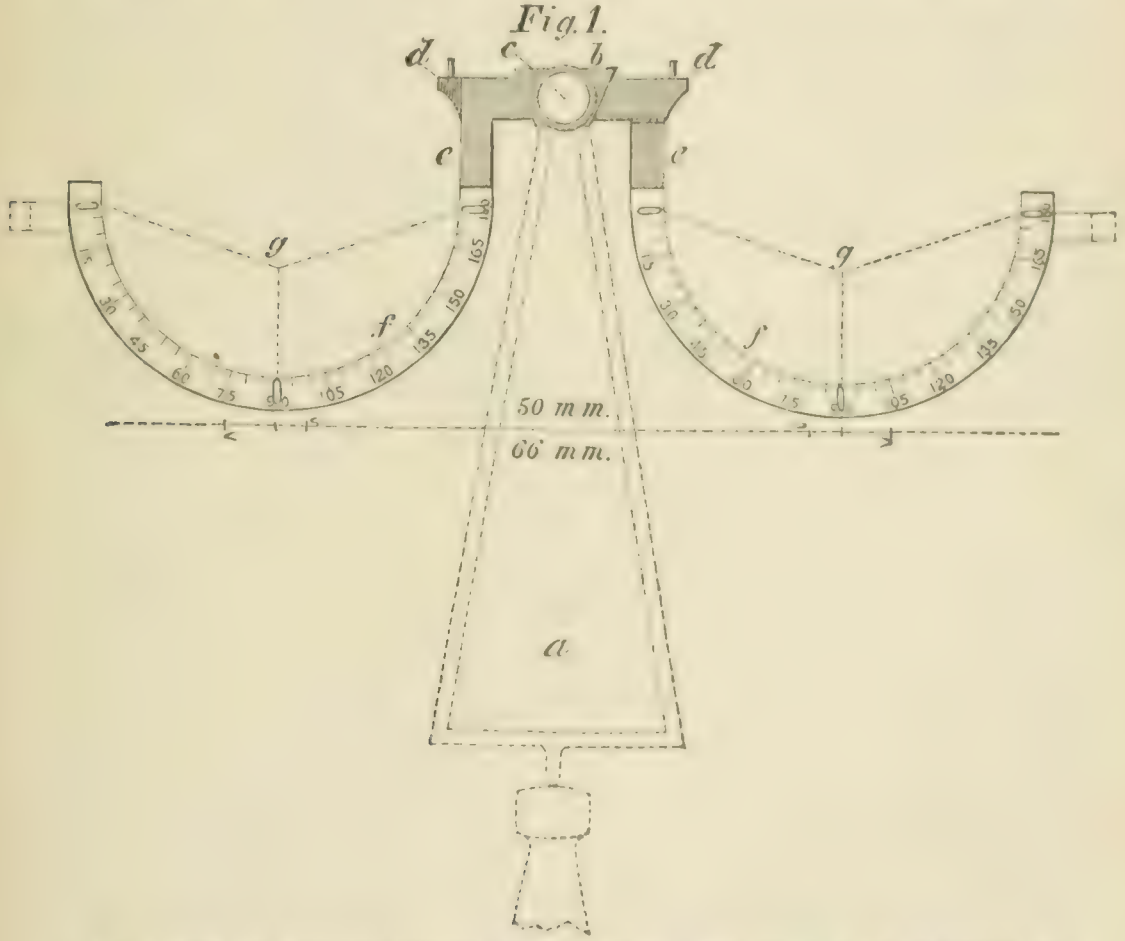


FIG. 1 shows the instrument arranged with the handle. The handle, *a*, fits into grooves on the face of the central block, *b*, and is retained by the screw, the enlarged head of which is shown at *c*; *d*, *d*, are the horizontal bars, sliding past each other through the central block, and *e*, *e*, are their vertical prolongations connected to the semicircular segments, *f*, *f*, along which slide the bands which give the third spaces for the lenses. The lettering is the same in all the figures.

other, all other movement being prevented by the close fit of the mortise. Each of these bars, bending at right angles, passes vertically down to become continuous with a graduated semicircle with its concavity upward, which is to hold the trial-lenses. Each semicircle consists of a half tube 7 mm. in length and 35 mm. in internal diameter, with a groove near its anterior and posterior surfaces respectively for the reception of the flanges of the trial-lenses, while

the equivalent of a third groove is furnished by a set of three hooks upon its front. The ridge between these grooves is 3 mm. broad, and is the exact continuation in position and size of the vertical arm, which is twice the breadth of the horizontal bar.

We have, then, the graduated semicircles suspended by the vertical arms from the horizontal bars, and capable of being approximated or separated by the movement of these bars through the central block. This block, as stated, is of truncated wedge shape, 5 mm. in breadth below, and 10 mm. above. The vertical arms and the semicircles they support can, therefore, be brought to with-

Fig. 2.

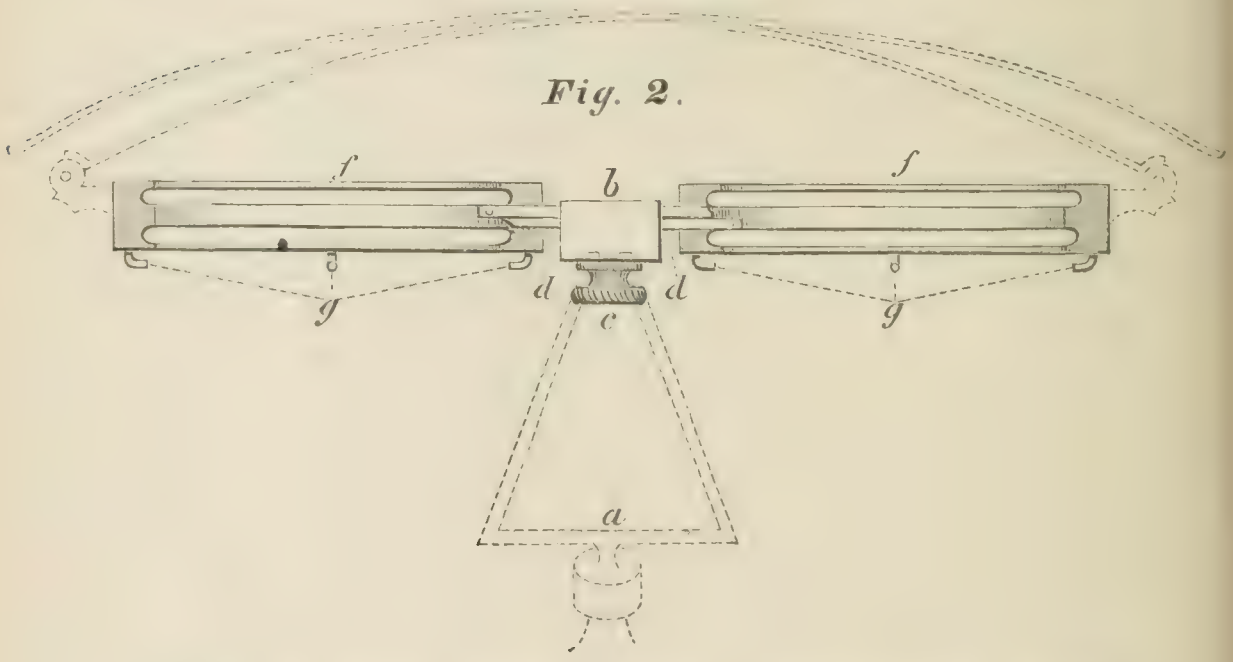


FIG. 2 shows the instrument from above, and indicates at once the arrangement of the handle and of the bows.

in five millimetres of each other, being held apart only by the lower part of the block. They can again be separated widely, limited in this direction by a little pin near the extremity of the upper surface of each horizontal bar. Each bar has thus a movement of 8 mm., and the distance between the centres of the graduated arcs can be varied from fifty to sixty-six millimetres, this being deemed sufficient. Any further amplitude could readily be obtained by increasing the length of the bars. As the horizontal bars correspond to the spaces between the grooves of the arcs, they do not interfere, even when centring at the narrowest, with the glasses placed in these, except when a very thick lens is placed with its prominence backward in the anterior groove. Any necessity for this is avoided by the use of

the hooks in front, except when three very thick lenses are simultaneously employed, with the frame at its narrowest. Then a little adjustment is necessary to place or remove the middle glass, but 20 D. — 8 D. = Pr. 15° can be thus used — a combination never exceeded, even in Dr. Green's combination sets of lenses, for which, therefore, this frame is admirably fitted.

The frame was designed to be used with a handle like that of the binocular ophthalmoscope of Geraud-Toulon; and this will probably be found the best way to employ it. If the patient sit in an arm-chair, it requires hardly any effort to hold the frame in position, the

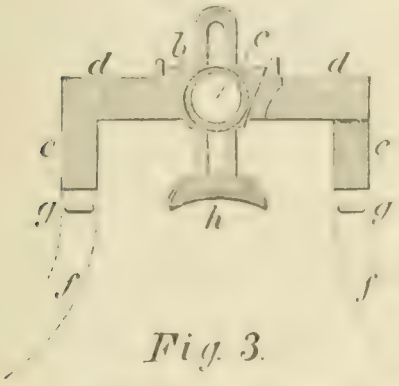


Fig. 3.

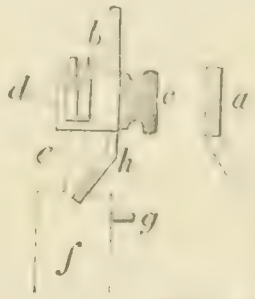


Fig. 4.

FIGS. 3 and 4 show the shape and arrangement of the adjustable bridge, *h*.

elbow resting on the arm of the chair. Where preferred, however, the bows of the ordinary frame are readily substituted; or, as in the instrument here presented, added so as to be easily detachable—so that it may be employed in either way. When used with the bows, the adjustment for height, so readily made by the patient's hand in the other case, has to be sometimes substituted by a mechanical contrivance. Only when centred very widely is this at all necessary, as the semicircles themselves generally rest upon the sides of the nose and hold the frame firmly in position. An adjustable bridge has therefore been added, carried by a slotted bar moving vertically in the same grooves and secured in any position by the same binding screw which would hold the handle, were that employed. This bar is bent backward at an angle of 45°, so that, while adjustable to any height vertically, its pressure always comes nearly at a right angle to the line of the nose, and it has therefore little tendency to slip. It is very readily adjusted, and, even when not necessary, makes the position of the frame more accurate and secure.

[NOTE. The instrument presented is made by Mr. Ivan Fox, Optician, 1632 Chestnut Street, Philadelphia.

TRANSACTIONS

OF THE

AMERICAN

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Eighteenth Annual Meeting.

LAKE GEORGE, 1882.

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1882-83.

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Whole number.....83

MINUTES OF THE PROCEEDINGS.

EIGHTEENTH ANNUAL MEETING.

FORT WILLIAM HENRY HOTEL,
LAKE GEORGE, *July* 26, 1882.

THE Society held its eighteenth annual meeting at the Fort William Henry Hotel, Lake George.

The Society was called to order at 9.50 A.M., by the President, DR. HENRY D. NOYES, who announced the following committees :

Committee on Membership and Nomination of Officers—DRS. JOHN GREEN, W. W. SEELY, G. HAY, A. MATHEWSON, and C. S. BULL.

Committee on Bulletin—DRS. S. THEOBALD and S. B. ST. JOHN.

Auditing Committee—DR. S. F. MCFARLAND.

The Treasurer, Dr. Richard H. Derby, of New York, read his annual report, which was referred to the auditing committee.

On behalf of the Committee on Membership, Dr. Hasket Derby recommended for membership Dr. A. Alt, of St. Louis, Mo. Upon ballot Dr. Alt was elected a member of the Society.

The auditing committee reported the Treasurer's state-

ment correct and it was accepted. The Treasurer moved that the assessment levied for 1882–1883 be five dollars. This motion was carried.

Dr. Knapp moved that each member of the Society who takes part in the discussion be requested to put his remarks as concisely as possible in writing, with a heading, and hand the same to the secretary before the close of the meeting. Carried.

The Secretary announced the death of Dr. E. Reynolds, of Boston, an honorary member of the Society.

Dr. Hasket Derby was appointed by the Chair to prepare for the "Transactions" a notice of Dr. Reynolds.

Dr. Green moved that twenty minutes be the maximum time to be allotted to the reading of any paper except by special vote of the Society in each case and by a two-thirds majority. That any paper requiring more than twenty minutes for its reading be presented in abstract under the same limitation to twenty minutes. Carried.

Dr. Green moved that this be a standing rule of the Society until rescinded. Carried.

The Committee on Bulletin reported, and the first paper was by

1. Dr. C. S. Bull: "Pulsating Vascular Tumor of Orbit, Eyelid, Temple, and Forehead, Treated by Electrolysis." It was discussed by Drs. Green, Knapp, H. Derby, and the President.

2. Dr. Seely: "Atrophied Remains of the Hyaloid System, with Attachment to the Lens and Detachment from the Papilla;" and,

3. "Serous Effusion into the Vitreous causing Total Temporary Loss of Vision due probably to Malarial Poisoning."

4. Dr. McKay: "Apparent Disappearance of Iris after Extraction of Cataract;" and,

5. "Non-Pulsating Exophthalmus, with Recurring Thrombosis of Orbital Veins."

The President suggested that the lesion described in the first paper was a case of reduplication of the iris. Dr. Seely and Dr. Buller also discussed this paper.

6. Dr. Norris (read by Dr. Harlan): "Hereditary Atrophy of the Optic Nerves and in Pigmentary Retinitis." Discussed by the President, Drs. Harlan, Kipp, Little, and McKay.

7. Dr. Little: "The Influence of the Faradic Current in the Treatment of Vitreous Opacities, with Cases." Discussed by Dr. Green and the President.

8. Dr. Merrill: "Glioma occurring in a Patient Twenty-one Years of Age."

9. Dr. Green: "A Case of Ruptured Zonula, with Remaining Accommodation." The President and Dr. Hay discussed it, and

10. "An Operation for Enucleation, with Removal of Tarsal Cartilage, and Conjunctival Sack." Discussed by the President and Dr. Knapp.

11. "Remarks on Operation for Entropion." Discussed by Drs. H. Derby, Theobald, Hay, Prout, Risley, Pomeroy, Knapp, Buller, Bartlett, and the President.

Upon motion now, it was decided to adjourn at 1.45, and meet again at 4 o'clock P.M.

12. Dr. R. H. Derby: "The Use of Nitrite of Amyl in Anæsthesia of the Retina." Discussed by Drs. Harlan, Risley, Knapp, H. Derby, Howe, and the President.

Dr. Theobald offered the following motion: "That in future meetings, no paper shall be referred to the publishing committee, unless the paper itself, or an abstract of it, shall

have been presented to the Society at its annual meeting." This motion was seconded and carried. Adjourned.

Meeting called to order, 4.20 P.M.

The President in the chair. The minutes of last session read, and after correction, accepted. The order of the bulletin was resumed.

13. Dr. S. Theobald: "Circumscribed Absorption of the Lens apparently of Traumatic Origin, without the Remainder of the Lens becoming Opaque," and

14. "A Fragment of Glass in the Eye, probably in the Ciliary Body for Ten Years without producing Serious Consequences." Dr. Green discussed this last paper.

Dr. Pooley further spoke to the paper last read by Dr. Theobald, as did Drs. Knapp and Kipp, and the President. Drs. Knapp and Kipp spoke upon the subject of Dr. Theobald's first paper.

15 Dr. Hay: "A case of Extensive Hemorrhage between the Choroid and Sclerotica." Drs. Knapp, Pooley, and the President spoke upon such cases.

The President invited Dr. Hasket Derby to take the chair.

16. Dr. Little: "Remains of a Persistent Hyaloid Artery attached to Crystalline Lens."

17. Dr. Buller described "A Case of Alopecia of the Upper Eyelids," and showed drawings and microscopical specimens of the diseased hairs. The chairman *pro tem.* suggested the possible value of pilocarpine in such a case.

18. Dr. H. D. Noyes: "Aids in the Removal of Foreign Bodies from the Cornea." Drs. Seely, Hutchinson, Kipp, McFarland, Theobald, and Buller spoke on the subject, and

19. "Penetration of a Foreign Body into the Orbit: Probable Wound of the Brain and Total Amaurosis."

Adjourned to 9 A.M. of Thursday.

July 27, 1882, 9 A.M.

Meeting called to order. Minutes of last session read and approved.

The discussion of Dr. Noyes' paper on foreign body in the orbit, taken up by Dr. McKay.

20. Dr. Noyes: "Reduction of Size and Tension of the Eyeball by Total Avulsion of Iris and by Neurectomy." Discussed by Drs. Little, Hay, Risley, Harlan, and Theobald; and

21. "Three Cases of Tumor of the Eye." Discussed by Drs. Buller and Prout.

22. Dr. Knapp: "Contributions to the Clinical History of Metastatic Choroiditis." Discussed by Drs. McKay, Hutchinson, and the President.

23. Dr. Harlan: "A Simple Test for Simulated Monocular Blindness," and

24. "Sarcoma of the Lachrymal Gland, Dislocating the Eyeball Downward, Forward, and Outward." Discussed by Drs. Theobald, Kipp, and Knapp.

Dr. H. Derby moved that the Business Committee make their report.

This was carried.

The Chairman of the Business Committee, Dr. Green, nominated the following officers for the ensuing year:

President—DR. HENRY D. NOYES, of New York.

Vice-President—DR. WILLIAM F. NORRIS, of Philadelphia.

Recording Secretary and Treasurer—DR. RICHARD H. DERBY, of New York.

Corresponding Secretary—DR. JOHN S. PROUT, of Brooklyn.

Publishing Committee—DR. E. G. LORING, DR. D. B. ST. JOHN ROOSA, of New York.

These gentlemen were all duly elected.

The Chairman of the Committee reported that in regard to a place of meeting for next year, the Committee was unable to decide between Lake George and Newport, and they preferred to leave the choice to the Society. The Secretary moved that to this list of places from which the Society should select, the Catskill House, Catskill Mountains, be added. Vote upon place of meeting was now taken and resulted as follows: For Newport, four votes; for Catskills, fifteen votes; for Lake George, two votes. It was decided then to hold the nineteenth annual meeting at the Catskills, and Drs. Harlan and Little, together with the Secretary, were appointed a Special Committee to make arrangements for holding the meeting there.

Dr. Hasket Derby moved to amend Section 3 of the By-Laws, by substituting in line two for the word "fourth," the word "third." Recess was taken and thereafter the meeting called to order. Dr. Hasket Derby's amendment was then carried. The order of the bulletin was again resumed.

25. Dr. Harlan showed improved trial frames.

26. Dr. Kipp: "A Case of Acute Inflammatory Glaucoma, followed by Cerebro-spinal Meningitis." Discussed by the President.

27. Dr. Mittendorf: "Embolism of the Central Artery of the Retina." (By title.)

28. Dr. St. John: "A Case of Double Glaucoma Fulminans," and

29. "Extraction of Chip of Iron from the Lens by means of Gruening's Magnet." Dr. Prout discussed the first paper.

By motion of the Secretary, permission was given the stenographer to furnish the Philadelphia *Medical News* with an abstract of papers read before the Society at this meeting.

In the absence of Dr. Thomson, the Secretary showed his new test-type disk.

Adjourned at 10.50 A.M.

RICHARD H. DERBY, *Secretary.*

Present at the eighteenth annual meeting:

DR. E. W. BARTLETT.
DR. C. S. BULL.
DR. H. DERBY.
DR. R. H. DERBY.
DR. J. GREEN.
DR. G. C. HARLAN.
DR. G. HAY.
DR. L. HOWE.
DR. E. HUTCHINSON.
DR. C. J. KIPP.
DR. H. KNAPP.
DR. W. S. LITTLE.
DR. S. F. MCFARLAND.
DR. A. MATHEWSON.
DR. R. J. MCKAY.
DR. C. S. MERRILL.
DR. H. D. NOYES.
DR. O. D. POMEROY.
DR. J. S. PROUT.
DR. T. R. POOLEY.
DR. S. D. RISLEY.
DR. W. W. SEELY.
DR. S. B. ST. JOHN.
DR. S. THEOBALD.
DR. J. J. B. VERMYNE.

Present by invitation:

DRS. J. A. LIPPINCOTT, Pittsburg, E. E. HOLT, Portland, Me.

RICHARD H. DERBY, M.D.,
Recording Secretary.

In Memoriam.

Dr. Edward Reynolds died in Boston, December 25, 1881. As the oldest ophthalmic surgeon in the country, a founder of the Massachusetts Charitable Eye and Ear Infirmary, and one of the few honorary members of this Society, a brief sketch of his life finds an appropriate place in the Transactions.

Born in Boston in 1793, and graduating from Harvard College in the class of 1811, he studied medicine for three years at home, and for three more in London and Paris, following, among others, Abernethy, Sir Astley Cooper, and Dupuytren. While in London he was made a member of the Royal College of Surgeons. He returned to America in 1818, and soon became widely known both as a practitioner and a teacher of surgery. A successful operation for cataract, performed by him on his father, attracted many cases of ophthalmic disease among all classes; and the extensive intercourse with the poor thus brought about induced him to establish an infirmary for their relief. In company with the late Dr. John Jeffries he founded, in 1824, a gratuitous clinic for diseases of the eye and ear, and treated nearly nine hundred cases during the first sixteen months of its existence. From this small beginning has grown the present Infirmary, with its extensive buildings, large staff, and more than ten thousand yearly patients. Dr. Reynolds' connection with the institution, first as surgeon and more recently as manager, lasted till 1870; and his interest in its workings continued unabated to the end of his days.

As a teacher he was one of the founders of the Tremont Medical School, and in 1837–38, during the absence of Dr. Warren in Europe, filled, temporarily, the post of Professor of Anatomy and Surgery at Harvard University. He received honorary degrees from Bowdoin College and Brown University, and in 1864 was made an honorary member of the American Ophthalmological Society, at its second annual meeting. Of late years he had retired from active practice.

For many years Dr. Reynolds was the leading ophthalmic surgeon in New England, and enjoyed an exceedingly large practice. Due, as this justly was, to his professional skill, it was largely aided by his never-failing geniality, entire absence of professional jealousy, and to a kindness as constant as it was unselfish.

PULSATING VASCULAR TUMOR OF ORBIT, EYELID, TEMPLE, AND FOREHEAD, TREATED BY ELECTROLYSIS.

By CHARLES STEDMAN BULL, M.D.,

NEW YORK.

Though the application of elctrolysis in the treatment of vascular growths is by no means a new thing in surgery, and although it has had a somewhat extended trial in small vascular growths or nævi in the eyelids, its application in the treatment of *large* vascular tumors of the orbit or eyelids, or in fact in any part of the body, has been limited. The following case is therefore reported, not only on account of its rarity and the great size of the tumor, but also as demonstrating the advantages and disadvantages of employing electrolysis in the treatment of large vascular growths in the vicinity of the orbit and eyelids.

The patient was a female child, M. E. S., who was admitted to the Nursery and Child's Hospital on September 19, 1881, at which date she was twelve weeks old, and I first saw the child one week later. The following information was obtained from the mother: The family history was excellent on both sides. The father and mother are both living and apparently in robust health. The little patient was their first child, and was born at full term, after a very easy, normal labor, on June 26, 1881, and has been nursed by the mother from her birth. She has never had a day's illness, and sleeps quietly and soundly at night. On the second or third day, the mother does not exactly remember which, she noticed a spot, about the size of a small nickel cent, half an inch above the centre of the left eyebrow, upon the forehead, and on the right of this, and near the median line, another of the same character but smaller in size. These two spots were but very slightly or not at all elevated above the surrounding surface, were very *white* as compared with the surrounding skin, but there was no swelling or roughness of the skin noticeable. The child grew rapidly, but the spots remained unchanged for a period of three weeks, and nothing abnormal was noticed

for the same period, when there appeared a slight discharge from the left eye, as if the child "had caught cold in the eye," which was probably muco-purulent in character, as the eyelids were glued together at times. Though this was treated with astringent applications by a physician of the neighborhood, the eye did not improve and the discharge continued. About the same period, or three weeks after birth, a small vivid red spot, as large as a pea, appeared upon the lower anterior surface of the right forearm and has slowly increased in size. The upper eyelid now began to have a swollen appearance, and partially concealed the eyeball, and about this time the two spots began to grow red, not suddenly, but very gradually, and this was accompanied by an extension of the swelling from the eyelid upward and forward. During the next five weeks there was an occasional cloudy, watery discharge from the eyelids, and the swelling of the upper lid and supraciliary region became more prominent.

The area of redness spread somewhat rapidly over the whole eyelid, upward upon the forehead, and slightly upon the temple at the external commissure of the lids. During the three weeks preceding the child's entrance into the hospital, the tumor increased in size very rapidly upward, outward, and inward toward the nose, as well as forward, giving a marked prominence to the growth in the supra-orbital region, and to some extent filling the zygomatic and temporal fossæ. The mother also noticed that the child could not lift the upper lid, that the eye was pushed very decidedly forward, and was very limited in its motions. The area of redness was always progressive, but not to the same degree in all directions, the main extension having been upward upon the forehead, "in two tongues," as the mother expressed it. It also gradually changed from a light red or pinkish hue to a reddish-purple color.

When I first saw the child she was a very marked example of perfect health in every particular, except the left eye and vicinity. A careful examination revealed the following condition of affairs: The swollen and purple eyelids projected almost directly forward in front of the plane of the orbit in a mass as large as the two closed fists of the child, so that, in a profile view of the face, it concealed the entire nose, except the tip. The lower lid was entirely hidden from view by the overhanging upper lid, which was pushed downward much below the level of the lower orbital margin, and about on a plane with the junction of the nasal cartilages with the naso-buccal furrow. The swelling extended over the entire upper lid, upon the bridge of the nose, and encroached upon the right side of

the nose and nasal end of the right eyebrow. The child's forehead was rather prominent, and the swelling extended well above the frontal bosses. The growth also filled the entire zygomatic fossa

and nearly the entire temporal fossa, extending backward to the anterior edge of the concha. Most of this swollen region in the lid and on the forehead was of a livid red or purple, but the inner or nasal end of the lid was much lighter in color, and the temporal

region was scarcely discolored. From the supraciliary region there extended upward two irregularly shaped tongues well toward the line of the hairy scalp, which were much brighter in color, and

resembled strongly in appearance the ordinary vascular nævus. The ciliary margin of the lid, while almost purple in color, was but little swollen, and there exuded from beneath it a thin muco-purulent discharge. The skin over the swollen region was tense, except at one point, the most prominent of all, which was situated over the line of the superior orbital margin, and at the union of the middle and inner thirds of the lid. Here the skin fluctuated on pressure, and was evidently very thin. Careful examination showed that the main swelling was in the subcutaneous tissue of the lid and eyebrow, and in the orbital tissue, while the skin itself was the seat of a pure nævus. The growth in the zygomatic and temporal fossæ, though yielding slightly to pressure, was firm and dense, but the swelling in the lids and orbit yielded markedly to pressure, and a few moments' compression with the fingers directly backward toward the apex of the orbit sufficed to diminish the size of the tumor by from one-half to two-thirds. The moment, however, that the fingers were removed the swelling reappeared as before.

On lifting the upper lid, the eyeball was seen to be pushed downward and inward, toward the nose, but there was little protrusion of the eye beyond the normal plane of the orbital opening, showing that the orbital part of the growth did not extend deeply into the orbit, but rather occupied its upper and outer portions, and this latter fact could be recognized by introducing the finger beneath the upper lid at the external canthus. The eye was limited in motion in all directions, but especially upward and outward. The media and membranes were perfectly normal, the iris reacted naturally, and an ophthalmoscopic examination showed a normal optic nerve and retina with no change or interference in the papillary circulation. Close observation of the apex of the growth discovered a slight pulsation visible to the eye, and this became more distinct to the fingers when a slight pressure was made upon the tumor. The thinning of the skin over the apex of the tumor, and its easy indentation at this point, convinced the writer that there was a cavity of some size in this region, which probably was entirely outside of the orbital cavity, and was filled with blood; and that, therefore, the tumor was of a mixed nature, cavernous as well as telangiectatic, in this resembling so many vascular tumors, not only of the lids but of other parts of the body. A vessel as large as a large goose-quill could be felt under the skin at the external angle of the lids, and could be traced a short distance toward the temple, and another one, somewhat less in size, was felt running across the bridge of the nose and

connecting with the angular artery on the right side; this was distinctly an artery, as it pulsated under the finger. Pressure upon one or both of these vessels made no difference in the swelling. Pressure upon one or both carotids produced no effect on the size of the tumor even when kept up for some time, but it stopped all pulsation. At no time was there any murmur or bruit noticeable over the tumor or vicinity. The child was very restless during this long examination, and cried persistently, but became quiet immediately when left undisturbed. Some bleeding from beneath the eyelids followed, but it was slight in character and ceased in half an hour. Another point determined by the examination was that the pressure of the tumor had produced an absorption of the underlying bone in at least two places, for just over the supra-orbital margin, in a line with the point of exit of the supra-orbital nerve, was a distinct excavation in the bone into which the point of the finger could be introduced, and at the external angle of the orbital margin was another and larger excavation. The skin over that portion of the tumor occupied by the two tongues before mentioned was corrugated both to the sight and touch, and all over the growth, in detached spots, there was a well-marked superficial arborescent vascularity. The nævus upon the forearm was about the size of a silver ten-cent piece, with elevated surface and sharply defined outline. There were no other marks anywhere else upon the child's body.

A consultation was held by all the members of the attending and consulting staff, all the gentlemen but one agreeing in their opinions as to the nature of the tumor, but differing somewhat in their opinion as to what ought to be done. One of the gentlemen, however, differed from the opinion of his colleagues that it was a mixed telangiectatic and cavernous growth, and thought that it might be malignant in character.

The methods proposed for the relief of the child were, with one exception, of the same nature and differed only in detail. The first thing to do was to cut off the blood-supply in one of several ways. The majority were in favor of ligating the left common carotid in the usual way. Another suggestion was to tie both the external and internal carotid arteries on the left side. Still another was to ligate both common carotid arteries, because the tumor extended somewhat beyond the median line and evidently drew some of its vascular supply from the vessels on the right side of the face, and also because of the possible internal anastomoses within the orbital cavity through the medium of the ethmoidal vessels. This proposition was aban-

doned, because it left the supply of blood to the head to be carried on only through the medium of the vertebral arteries, and in an infant these vessels are very small and probably of insufficient size for the nourishment of the parts. It was thought that the left common carotid artery at least should be tied, as a preliminary step, and that afterward, in case there was but little diminution in the size of the tumor, an operation might be undertaken for ligating any smaller vessels round the base or outskirts of the tumor. It was the opinion of most of the gentlemen who saw the case that electrolysis was not to be thought of as a primary or preliminary operation, owing to the extreme size of the tumor and also to the probability that it was a mixed cavernous and telangiectatic growth; but that after the carotid artery had been tied and the child recovered from the operation, electrolysis might be essayed as a further help in bringing about coagulation and diminishing the size of the tumor. From all these opinions the writer ventured to dissent. He was of the opinion that the child was too young to allow of any hopes of a successful result from ligation of the common carotid artery, as death would probably ensue. The operation of ligating the nutrient vessels at the base or periphery of the tumor he thought too dangerous to be justifiable without previously tying the common carotid. He was strongly inclined to try electrolysis as a primary operation as the least dangerous in the case, while it might produce at least a partial result in lessening the size of the tumor. It was finally decided to keep the child under observation in the hospital and await further developments, and to give five-drop doses of the fluid extract of ergot three times a day, as a possible means of controlling the circulation.

The child was under observation until the end of December, and during the first month of this period the tumor slowly increased in size and the skin over the palpebral portion seemed to grow thinner, but about the fifth week after the administration of the ergot had been begun, the growth seemed to stop and the tumor remained apparently stationary in size for several weeks. Then it began to slowly diminish in prominence, and this continued until the end of December, when the mother was permitted to go home with the child, upon condition that she was to return immediately if any change for the worse appeared.

During all this time the ergot had been constantly administered, and the mother was directed to continue its use at home. The child was not seen again until the middle of March, 1882, at which

time the tumor had increased very much in size, and the anterior skin wall was extremely thin. The mother had neglected the ergot treatment, and there had been recently several small hemorrhages, which apparently came from beneath the surface of the lids, and frightened the mother very much. There was no change whatever in the child's general condition, and, after a week's observation, it was not deemed advisable to postpone operative interference any longer. As at the first consultation, so now, the writer determined on electrolysis, as perfectly applicable to a soft growth which contained a decomposable liquid, whether arterial or venous, or both. It was thought that the decomposition of the blood and the accumulation of the acids and alkalies at each of the poles would bring about a chemical cauterization in the walls of the blood-vessels. This would probably aid the physical cauterization produced by the heat developed by the galvanic current passing through the needles, and thus assist in the disintegration and absorption of the tumor. There would be little or no danger of hemorrhage, as the coagulation would be instantaneous around the needle punctures, and the only danger to be feared would be a possible suppuration and abscess in the tumor, ending in perforation of its anterior wall. We know that this electrolytic action is most pronounced at the cathode, and that absorption is hastened by the chemical effects of the current and the mechanical and irritating effects of the needles, and that this may slowly continue for weeks. As a result, disintegration and atrophy take place, which continue for a long time after all electrolytic treatment has ceased. Another fact which inclined the writer strongly to electrolysis lay in the knowledge that we have that an erectile tumor offers but little resistance to the passage of the galvanic current, and its tissue readily electrolyzes. Furthermore, in vascular tumors, both poles of a galvanic battery may be made to operate simultaneously.

The first application of the electrolytic method was made on March 28, 1882, the child having previously been etherized. The battery first employed was a zinc-carbon Stöhrer battery; and on the principle that definite electro-chemical action may be excited when either one or both electrodes are broad flat disks, the first operation was done with a needle at the negative pole, and a flat sponge disk at the positive pole. The needle was plunged through the skin into the tumor at the external angle of the orbit, and the sponge or positive pole was at first placed over the swelling in the temporal fossa. The current from two cells was then turned on,

and after one minute increased to four cells, and after another minute to eight cells. At the end of the third minute the positive pole was removed from the temporal fossa, and placed over the superior orbital margin, just covering the thinnest part of the tumor-wall. The number of cells was then gradually increased to sixteen, and after six minutes had elapsed from the time the current was first allowed to pass through, it was broken. A small nodule of condensation was felt around the negative pole, and the needle was withdrawn with some difficulty. Time, six minutes; current from sixteen cells. The child rapidly regained consciousness, and in less than ten minutes was laughing and crowing in its mother's arms. There was no perceptible change produced in the tumor by the operation, and no general rise of temperature, or any untoward symptom, in the general condition of the little patient.

On April 1st, the third day after, the second session was held. The child was etherized as before, and the needle, or negative pole, inserted about half an inch from the previous point of insertion, and just over the superior orbital margin. The positive pole, or moist sponge disk, was applied to the nasal end of the tumor, and a current from two cells was then passed. The number of cells was slowly increased to sixteen, and the positive pole was slowly moved about all over the inner or nasal half of the tumor. This second session lasted twelve minutes before the current was broken. As before, a quite marked nodule of condensation was felt at the negative pole, and the needle was removed with some little difficulty, and was followed by two or three drops of almost black blood. The child regained consciousness rapidly, and its general condition was apparently entirely unaffected, either by the etherization or the operation, there being no rise of temperature or acceleration of the pulse. Current from sixteen cells; time, twelve minutes.

The *third* session was held on April 7th, six days later, and a different battery was made use of, being a modification of the ordinary zinc-carbon battery by Spamer. The battery-fluid employed was composed of potass. bichrom., 20 grammes; acid. sulphuric., 45 grammes; hydrarg. sulph., 2 grammes; and aq. destill., 300 grammes. As electrolysis is produced most quickly and effectually when the current is made very dense by the use of small needles, it was determined to use small needles at both poles. The negative pole was introduced into the tumor on the nasal side, just at one side of the bridge of the nose and below the inner end of the

eyebrow, and the positive pole was introduced on the temporal side near the external angle of the orbit and just above it. As at the other sessions, the operation began with a current from two cells, and this was gradually increased to eighteen cells. The distance between the points of the needles was about half an inch, as nearly as could be determined. Marked condensation occurred at the negative pole and a somewhat slighter hardening at the positive pole, but there was no perceptible diminution in the size of the tumor. Both needles were withdrawn with some difficulty, and their removal was followed by some slight bleeding. The superficial color of the tumor became decidedly paler, and this was also noticeable in the two tongue-shaped nævi which ran up on the forehead, and lasted for a short time after the breaking of the current. Current from eighteen cells; time, twelve minutes.

The fourth session was held on April 11th, four days later. The negative pole was introduced just below and to the inside of the external canthus, and two needles were attached to the positive pole, one being introduced on the nasal side, very near the point of entrance of the positive pole at the previous session, and the second being introduced through the lid lower down. A current from two cells was then passed, and this was somewhat rapidly increased in strength, until twenty-two cells had been connected. The two positive poles evidently entered a cavity, as they moved freely about and could be made to rub against each other. The tumor blanched rather rapidly under this current, which was kept up unbroken for fifteen minutes. When the current was broken the needles at the positive pole were removed without any difficulty, but the negative pole was removed with great difficulty, came out with a jerk, and was followed by some fluid blood and a good deal of thick disintegrated blood. Violent reaction followed, with marked increase in size of the tumor, a rise of temperature to 102½, and pulse of 168, with vomiting, crying, and constant restlessness, coming on in about five hours. There was marked and extensive condensation about all three needle-holes, and a perceptible diminution in the size of the tumor. The unpleasant symptoms disappeared on the following day, but the condensation remained and had increased, so that over a space included between the points of entrance of the needles the tumor was hard and firm, and pulsation had ceased. The area of condensation was about an inch and a quarter in diameter, and was of an elliptical shape. Owing to one of the needles having partially lost its insulating envelope, there was a small slough of the skin at

its point of entrance, but this proved to be very superficial and there was no hemorrhage at this point. The hardening and condensation increased slowly as long as the child remained under observation, but unfortunately the father removed her from the hospital on the fifth day after the operation, contrary to the expressed wishes and direct orders of the writer.

In conclusion I have to thank Dr. Charles T. Poore and Dr. Beverley Livingston for the use of their batteries and their kind assistance at the operations, as well as Drs. Henry and Murray, of the House Staff of the Nursery and Child's Hospital.

REMARKS.

DR. JOHN GREEN, of St. Louis, was of opinion that absolutely nothing was gained by employing an apparatus of this particular kind.

DR. H. KNAPP had seen a case of a similar nature, in which the angioma began soon after birth as a small red nodule at the outer part of the upper lid. In the course of eighteen months it had increased in every direction and occupied, when seen by the doctor, almost the whole corresponding side of the head, face, and neck. The case was considered incurable.

DR. H. DERBY, of Boston, asked Dr. Bull what size needles were employed. Dr. Bull replied, the smallest.

ATROPHIED REMAINS OF THE HYALOID SYSTEM ATTACHED TO THE POSTERIOR POLE OF THE LENS AND DETACHED FROM THE PAPILLA.

BY W. W. SEELY, M.D.,

CINCINNATI, O.

J. V. V., of Kentucky, thirty years of age, says he noticed dimness of vision in his left eye eighteen years ago. I examined the eye when he was a student of the Medical College of Ohio, November 23, 1880.

V. = $\frac{2}{7}$, and, with +1.5 Dc. axis 90° or −1.5 Dc. horiz., V. = $\frac{20}{LXX}$.

The ophthalmoscopic examination revealed a dark thread with

vermicular movements on the slightest change of position of the eyeball. The woodcut (the drawing was made by my assistant, Dr. D. De Beck) shows the position it invariably assumed when at rest. Now and then the movable end apparently shot backward, reaching quite to the papilla. As will be seen by the cut, the attachment was at the posterior pole of the lens. So far as I have been able to find in the published records of the atrophied remains of the hyaloid system, this is the only case in which the detachment has occurred at the papilla.

SEROUS EFFUSION INTO THE VITREOUS.

By W. W. SEELY, M.D.,
CINCINNATI, O.

SEROUS EFFUSION INTO THE VITREOUS HUMOR, CAUSING TOTAL TEMPORARY LOSS OF VISION, DUE PROBABLY TO MALARIAL POISONING—RECOVERY.

FROM reports by various observers [1] it seems pretty clear that no part of the eye has immunity from the poisons of malaria and miasma, but I am not aware that any record has been made of the total abolishment of vision from *serous effusion* into the vitreous as the result of malarial poisoning.

The patient was a man thirty-three years of age, who appeared and claimed to be, and to have been free from disease or injury of all sorts, and in whom no indications of such could be discovered by repeated examinations and questionings.

The history of the ocular trouble, in brief, as given me was as follows: About September 15, 1879, he noticed rather suddenly dimness of vision and floating bodies (I will refer to these further on), and was just able to read. By September 25th, *i.e.*, in ten days, the vision had grown so much worse that he came to Cincinnati to consult an oculist, by whom, as I afterward learned, he was told

[1] I would make special mention of Dr. Kipp's paper before the Medical Society of New Jersey, On Eye Affections from Malarial Poisoning.

that the eye was full of blood. He underwent a course of sweating for a week with jaborandi, which was followed up by pills, pilocarpine (?) possibly. The vision remained about the same for six weeks, when it grew still worse, and leeches were applied and various remedies prescribed, though he did not know what they were. At this visit to the city he remained about three weeks in a dark room and continued to grow worse. In about six weeks the vision had cleared up somewhat, when he was given phosphorus, and the vision cleared up still further.

About the middle of February, 1880, vision was totally lost in about two hours. He returned again for treatment, and leeches were applied, the patient remaining in bed in a dark room for six weeks.

May 1, 1880, he was led to my house. I found a long-standing external squint of one eye with extreme amblyopia, and no perception of light in the other formerly good eye, except the faintest by the most peripheric upper and inner portion of the retina, after mydriasis. Pupillary reaction limited and tension normal.

With the ophthalmoscope and undilated pupil everything was a blank. On dilating the pupil with duboisia, and looking upward and inward in the extreme, I could get a trace of red reflex.

I was immediately impressed with the fact that I had never seen such a case before. The patient seemed very much surprised at my perplexity, and asked if there was anything more than the "blood."

As yet I had learned nothing of his history, and of course was entirely ignorant of what diagnosis had been made. I simply knew he had been treated.

At the close of my examination I gave the opinion that the vitreous was filled with effused *serum*, and that, so far as I knew, there could only be one explanation—malaria—though no history of any other manifestation had been elicited. Subsequent examinations only confirmed me in the view taken.

The patient went home July 20, 1880, with vision $\frac{20}{XX}$. No trace of any fundal disease could be discovered, though I examined the eye almost every day for two months, *i. e.*, till vision had become normal; nor was there at any time visible floating bodies; and while the patient claimed he saw such in the beginning of his trouble, he finally said it was rather a "waving" before the eye.

The vitreous began to clear up in a day or two after the first visit of the patient, and the vision grew so rapidly and uninterruptedly

better, that I resorted to no treatment other than duboisia dilatation for my examinations.

In September, 1880, the patient wrote me that, after a long drive in the rain, his vision had deteriorated somewhat, "had become smoky," but he did not come to the city, although the vision continued poor, till October, when he remained four or five weeks, during which the vision rapidly returned to $\frac{20}{xx}$, with some floating bodies, perceived with difficulty by the ophthalmoscope.

During this visit I was sent for, the messenger saying my patient was very sick. It proved to be a severe chill.

I now gave him some pretty large doses of quinine for a few days. A letter received from the patient, April 17, 1882, says: "I am about the same as when I last saw you," *i. e.*, visually. He complained somewhat of what he called a lame feeling in the region of the kidneys, the same as he had done often before, and I wrote him to take quinine for a time. A very large number of examinations were made of the urine, but nothing abnormal found.

We, of course, know that malaria produces a similar state of things in the kidneys, even a hæmaturia, and I am confident I have seen at least one case of effusion into the middle ear due to malaria, though the patient, as I diagnosticated, was suffering from malarial albuminuria, and hence not to be absolutely set down as the primary result.

Is it not probable that in the case narrated, as in the kidney and bowels, the poison selecting the blood-vessels, prepared the way for the escape of the watery part of the blood—an effusion?

That a more profound effect can be produced upon the choroidal or retinal vessels by malaria, giving rise to hemorrhage into the vitreous, I am prepared to believe from my own observation, though the two cases in support are lacking in such completeness of examination as to justify a detailed report. However, what my cases lack in completeness is quite supplied by the one reported by Dr. Kries, in Vol. XXIV., Part I., page 159, of "Graefe's Archives."

I will add, in conclusion, that a differential diagnosis, at least to my eye, between what was in this eye and a hemorrhage, was not at all difficult.

This impenetrable cloud of mist made, to my eye, a striking contrast with the solid blackness in some cases, the red appearance in others, of a hemorrhage.

In reply to a question by the president, Dr. Seely said the vitreous was opaque, that there was no evidence of syphilis.

APPARENT DISAPPEARANCE OF IRIS AFTER EXTRACTION OF CATARACT.

By R. J. McKAY, M.D.,
WILMINGTON, DEL.

James W., aged fifty-seven, mechanic and farmer, had in his early manhood been more or less addicted to drink, and was very excitable under its influence, but for many years had not stimulated at all. He called upon me June 10, 1879, to have his eyes examined. The sight of the right eye began to fail three years previously, and was now blind from mature cataract, and the left eye failing from incipient cataract. Its V= fingers $3\frac{1}{2}'$.

September 16th following, Graefe's method of extraction was performed upward, under anæsthesia by Squibb's ether and chloric-ether, to which he succumbed after taking them about three-quarters of an hour, and making so much resistance as to cause great congestion of face and head. Excision of iris was followed by immediate filling of anterior chamber with blood, which was partially removed several times, leaving very little in it. During the evening, five to six hours after the operation, he manifested maniacal excitement for several hours and was very restless, requiring four persons to keep him in bed. Examination of eye forty-eight hours afterward showed a blood-clot in anterior chamber, obscuring almost the entire iris. Moderate iritis and capsulitis ensued, which was treated by atropia and warm water bathing. Six weeks after the operation he could read Snellen type No. 6 in about 6″ with $+2\frac{1}{2}^{s}$ lens, through a linear aperture between the layers of unabsorbed blood-clot. The atropia was continued and slight dilatation of pupil was obtained. About two months after the operation, while visiting him at intervals of several days, I was surprised to fail to discover the usual color of the iris, and was perplexed for a time as to its absence, not knowing whether permanent dilatation of the pupil, or complete atrophy of iris had occurred. Eserine was used in solution, but only caused spasmodic contraction of ciliary muscle, and nothing of the color of iris was ever to be seen afterward. The aqueous remained clear and anterior chamber fully established. Ex-

amination manifested a complete opacity of entire capsule apparently, with irregular linear deposits of blood pigment upon it, *corresponding to original site of blood*, and not like iritic pigmentary deposit.

Ophthalmoscopic examination gave a uniform red reflex all over capsule, but too indistinct to see details of fundus clearly. The second American edition of Soelberg Wells, page 165, says: "It has been urged by some that the long-continued use of a strong solution of atropine is apt to produce permanent dilatations of pupil from paralysis of the sphincter pupillæ," and adds: "But this is a most rare and exceptional occurrence, and may be easily overcome by use of calabar bean." The American edition of Stellwag of 1868, page 187, mentions briefly complete atrophy of iris, and says "that the iris has more the appearance of a gauze-like, extremely delicate transparent membrane." Knapp's "Reports and Remarks on a Third Series of One Hundred Cases of Cataract Extraction by the Peripheric-Linear Method," in "Archives of Ophthalmology and Otology," Vol. I., pages 103–139, and also a similar "Report and Remarks on a Fourth and Fifth Hundred of Cataract Extractions According to Von Graefe's Method," in Volume VI. of same "Archives," pages 7–134, although very full, interesting, and instructive, does not describe anything at all analogous in its results to my case.

February 24, 1880, a secondary operation was done upon capsule, and later a $+4^s$ blue-glass lens was ordered for bright days. He began to recognize persons and objects well, when a dense opacity of vitreous occurred, dependent upon great excitement due to family troubles, and continued to August, 1880, when he moved to Ohio, and passed from under observation.

In Alt's "Lectures on the Human Eye in its Normal and Pathological Conditions," of 1880, page 92, under "Atrophy of Iris," he says: "In one case of very far advanced atrophy of the iris I found the anterior endothelium in a state of colloid metamorphosis. With a low magnifying power it appeared like a new-formed transparent lamella, covering the anterior surface of the iris. With a high power it was easily seen to consist of endothelial cells, filled with colloid substance." And he ends the article with, "Atrophy of the whole iris, of course, involves also its blood-vessels and nerves."

REMARKS.

The President asked whether there was any loss of the vitreous during the operation? To which question Dr. McKay replied: "A

very slight amount." The President remarked that the Society would probably accept the Chair's explanation of the case to be the correct one, to the effect that it was a reduplication of the iris, a folding back of the ciliary processes.

DR. SEELY said he had regarded reduplication of iris backward, as stated by Dr. Noyes, as the explanation of such disappearance of the iris, one of two examples of which he had seen after cataract extraction with resultant hemorrhage.

DR. F. BULLER saw a case of disappearance of the iris after removal of cataract in a young man about eighteen years of age. The cataract had been needled two or three times in the course of a few weeks, and then almost completely extracted by the use of a curette. A moderate degree of reaction followed this, and the pupil was kept pretty largely dilated with atropia. About a week or ten days after the extraction he was surprised on making the morning visit to find that the iris had entirely disappeared, although up to this time the eye had presented nothing unusual in its appearance. The patient denied having in any way injured the eye during the night.

There was no intra-ocular hemorrhage, but a considerable cloudiness of the vitreous, so that the optic nerve could only be dimly seen. This cloudiness increased to such an extent that a few days later nothing could be seen of the fundus. Eserine or calabar extract was used freely without benefit, and the patient left the hospital shortly afterward unrelieved.

He regarded the case as one of complete retroversion of the iris, which, however, was certainly not at all atrophied when it occurred.

DR. MCKAY said the patient had seen an oculist of Cincinnati, he believed Dr. Wilson, who, according to the patient's statement, was of opinion that atrophy of the iris had not ensued in this case.

NON-PULSATING EXOPHTHALMUS, WITH RECURRING THROMBOSIS OF ORBITAL VEINS.

By R. J. McKAY, M.D.,
WILMINGTON, DEL.

At the suggestion of Dr. L. P. Bush, her family physician, Mrs. McC., aged twenty-eight and one-half years, native and resident of Wilmington, Del., called to see me professionally February 17, 1881, about the protrusion of her right eye. She said it was first observed when she was ten years old, and had always been more noticeable when she was angry.

She began to menstruate at thirteen years of age and the protrusion was always more manifest at those periods, beginning a few days before the flow and continuing a day or two after it ceased, thus experiencing monthly eight or nine days of more or less enlargement.

No history of injury or accident could be obtained to cause or complicate the protrusion.

For a number of years it increased in size very slowly and gradually. She was married when between twenty-one and twenty-two years of age. It did not enlarge during pregnancy, but did very much during each labor.

She has had three children, aged respectively six and three years, and a baby six months old, which she was then nursing. All of her labors were severely straining and tedious.

During her first visit to me she presented such an unsightly appearance that she said she covered her face well when out-doors to prevent people staring at her.

The right orbital and temporal regions were greatly enlarged and congested. The right upper eyelid was of a dark red hue and tense from being stretched to apparently double its usual size in every way to cover the right eye, which protruded fully three-fourths of an inch farther than its fellow, and she could not entirely close her right eyelids. Several nodules of distended vein were seen at upper inner angle of orbit (which first appeared just after her second child was born), and more were felt there as well as above and behind the eye, extending back into the orbit.

The conjunctival surface of lower lid was engorged, thickened and inflamed. The movements of right eye were all diminished, but more especially upward and inward. The cornea and media of both eyes were clear and refraction hypermetropic. The optic disk of right eye had a grayish line, and its V.$=\frac{16}{XXX}$ in dim light. The optic disk of left eye normal, and its V.$=\frac{16}{XX}$ in dim light. Inspection of cheek, nose, and mouth revealed nothing abnormal. She had never heard any noise about the eye or head. No bruit was discovered by stethoscopic examination of eye or head. Pressure upon eye could not reduce it perceptibly. Pressure upon right carotid artery could not be borne longer than four minutes even in a recumbent position, because of pain and dizziness, and it caused no change in the appearance of the parts.

Prescribed for the conjunctivitis and told her the protrusion was due to enlarged orbital veins behind the eye and advised non-interference at that time. She then told me Dr. Agnew, of Philadelphia, had given her the same opinion and advice three years previously.

April 9, 1881, was called to see her, and found the right lower lid everted, which was readily reduced. Four days later learned it had been several times everted and reduced by Dr. Bush (who was attending her sick baby), and he had applied adhesive plaster strips to prevent eversion, which produced pressure upon upper eyelid and eyeball, causing pain and discomfort. Removed it and applied a flannel pressure bandage, gently raising the cheek and lower lid, but it could not be borne, because the eversion, œdema, and swelling of both lower ocular and palpebral conjunctiva increased notwithstanding free scarifications.

On April 15th, three days later, she complained of losing sight of right eye, and ophthalmoscopic examination showed optic neuritis. The protrusion and swelling of orbital veins were increasing.

April 20th.—Scarifications of everted lower lid. 21st.—Less swelling, and marginal corneal ulcer first observed at its lower edge. The only movements of eyeball now were very slightly from side to side. 28th.—Within last two or three days there has been less swelling of orbital contents and less distention of upper lid, and the venous plexus at upper inner orbital angle was less movable and less compressible by digital examination. A sero-purulent discharge was observed, and the whole cornea was covered by a yellowish, opaque, tough scab, which was partially removed and paracentesis was done with a straight, lance-shaped iridectomy knife. No discharge followed, and the eye became so painful for several days that anodynes

were necessary to quiet her sufferings. Her appetite became very poor and she became very weak and pale.

Early in May thrombi formed in the visible and palpable orbital veins, and they subsequently became very small. The cornea sloughed entirely off. Plastic irido-choroiditis ensued and frequent punctures of iris lessened size of globe, but not very materially. Incisions to overcome occlusion of pupillary margin of iris were unavailing to procure discharge of vitreous contents of eyeball, although frequent tents and plugs of lint and cotton were introduced and left in the incisions and continual poulticing of eye was kept up nearly two months.

Early in June the nursing of the baby was stopped. She became comfortable and regained strength somewhat during the first three weeks of June. On the 21st the eye began to swell and pain, and the 23d I enucleated it under ether, with the assistance of Drs. L. P. Bush and I. W. Hazlett, of Wilmington (Dr. James R. Taylor, of New York City, being present).

After its removal the orbit seemed filled with a mass of veins, which felt like a varicocele very thinly covered. A flannel pressure-bandage, applied moderately tight, had to be removed next morning because of great pain in orbit and right side of head. Her menses came on during the night after the enucleation and continued five or six days. The swelling and enlargement of contents of orbit and the everted, dependent lower lid greatly increased. Fever ensued, with irregular chilly sensations, and she manifested slight delirium during several nights. Grave apprehensions of purulent infection were felt, thrombi again formed, and the dangerous symptoms gradually subsided, although for several weeks thereafter her stomach was so irritable and intolerant of all kinds of food that inanition was seriously threatening. To Dr. Bush I am under grateful and lasting obligations for advice and daily assistance at this critical period.

In latter part of July, when her menses again appeared, the right orbital contents, eyelids, and temporal region again became engorged, painful and enlarged, but all in a much less degree than in June, and no grave symptoms accompanied them, although a third manifestation of thrombosis ensued. From that time at each successive menstrual period, the enlargement of orbital region and surroundings seemed less and less marked, and before the end of the year the right upper lid looked nearly as small and natural as that of the other eye, and the orbital contents were shrunken somewhat

below the level of the edges of orbital margin. The lower lid was still everted and its conjunctival surface congested, thickened, and dependent. She called upon me April 4, 1882, to have something done to remove the unsightly condition of lower lid, which remained everted, dependent, and swollen, but less congested and not at all tender to the touch, as formerly. She reported that during the last few menstrual epochs a shrinking of parts about the right orbit seemed to take place and she experienced no discomfort.

The floor of orbit looked pale and sunken. The upper lid was sunken as usual after enucleation, with the exception of a small mass of the enlarged vein, which can be seen and felt at upper, inner angle of orbit. It is slightly firm but not at all tender.

The everted lid was readily replaced in orbit and kept up by strips of adhesive plaster applied vertically, extending from slightly below lower orbital margin upon supra-orbital region. Two days later it was reduced considerably in size and manifested very little tendency to roll out and downward. Further reduction was procured by applications of pure stick of nitrate of silver, which have been repeated from time to time since. Now, very slight ectropion occasionally manifests itself, and she wears smoked glass with gold wire goggle protection and screen, and a + 60 glass to correct the hypermetropia of left eye.

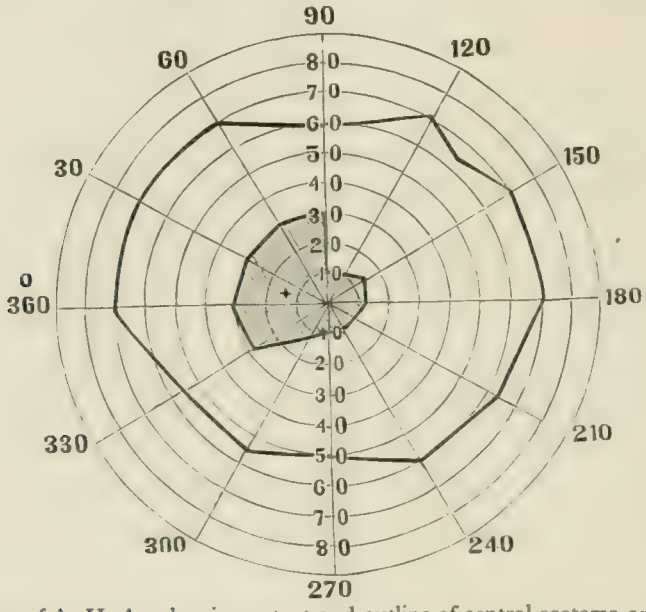
HEREDITARY ATROPHY OF THE OPTIC NERVES.

BY WM. F. NORRIS, M.D.,
PHILADELPHIA, PA.

CASE I.—A. H. A., aged forty-nine, is a well-developed, vigorous-looking man, never addicted to the use of either alcohol or tobacco; complains that for about a year he has been losing sight, and is now so blind that he has some difficulty in getting about by himself. He was conductor on one of our steam railways, but found a cloud settling over his sight, which in a few weeks became so dense that he could not see signals nor read ordinary print, and was consequently compelled to abandon his avocation. At present, his eyes appear normal externally. The pupils are of medium size, and respond promptly to changes of light and shadow. Central vision is, however, almost completely abolished in both eyes, and he can only count fingers when they are about six inches to either side of the visual axis. He can, in a dark room, however, see a gaslight five feet distant, when looking directly at it, when it is turned down to the size of a candle-flame, but not when the illumination is farther diminished. The patient complains much of any bright light, and when out in the sunlight, always wears smoked glasses. The ophthalmoscope shows that the disk of the right eye is slightly ovoid vertically, with a choroid ring all around, passing into an irregular black-peppered *conus* to the outside, which is one and one-half times the width of the main central veins. There is a slight central excavation, but the rest of the disk is of a greenish-gray hue, a trifle prominent. It is entirely devoid of capillarity, but the central vessels have about their usual calibre. The choroid is perhaps more granular than usual; but beyond this, and a very slight retinal haze around the disk, there are no demonstrable changes in either it or in the retina. In the left eye the disk is more nearly circular; there are remains of a choroidal ring which has existed all around, but is now absorbed in places. The scleral ring is too marked all around, and outward there is a black speckled *conus* one and one-half times the width of the main retinal veins.

The patient was given $\frac{1}{32}$ of a grain of strychnia three times

daily; the quantity of this drug was gradually increased till he took $\frac{1}{16}$ grain at each dose, and in about a month, there was marked improvement, so that the accompanying field of the right eye could be taken with a Sherk's perimeter, candles being used for the fixation point and also for the peripheral object—the scotoma was outlined by the use of a black penholder—the candle-flame still being used



Field of right eye of A. H. A., showing extent and outline of central scotoma and limits of peripheral light perception.

for fixation. The vision was now $\frac{1}{cc}$, when the patient looked about six inches below the letter to which his attention was directed. The peripheral vision has so much improved that he can walk about with much greater confidence. The strychnia treatment was continued for some time longer, but apparently with no further improvement of the vision.

CASE II.—C. H. K., aged fifty years. He is a first cousin of the former patient on the mother's side, and complains of the same central cloud in his field of vision. The right eye distinguishes Sn. CC at one foot, the left, Sn. CC at five feet; in both cases with eccentric fixation. In a dark room, patient could distinguish through the central cloud, when looking directly at it (with the right eye), a gas-flame turned down to about the size of a usual candle-flame, and with the left eye, the same object when it was diminished to one-fourth of this size. Examination of the field with candles shows in right eye an irregular central scotoma, varying from about 15° to 20° around the point of fixation. The candle is seen most distinctly in the lower outer part of the field. In the left eye the

image is dim at fixation point, and there is a cloud extending from it in every direction about 5° below and about 20 above; vision much the best in the lower part of the field. The pupils here, too, were of medium size and prompt, but the patient is not so much inconvenienced by strong light as in the other case. The ophthalmoscope here, also, shows a greenish atrophy of the optic nerves, with entire want of capillarity of the disk, and but little change in the calibre of the central vessels. In each eye, the scleral ring is unduly marked all around the disk. A similar treatment was inaugurated, and after some weeks' use of the strychnia the central cloud was slightly diminished in density, and the peripheral vision markedly improved. The patient remarks that "now, when looking in the glass, he can see his own gray moustache." O. D. V. $= \frac{3}{6}$; O. S. V. $= \frac{5}{CLXX}$; in both, eccentric fixation.

In both patients, the patellar tendon reflex was examined and found to be prompt.

These patients are first cousins, their mothers being sisters; and thus give a most interesting history of hereditary atrophy, beginning with the maternal great-grandfather and extending through four generations. The blindness has usually been transmitted by the female side of the house, and has affected both males and females, but the former much more frequently. It is noteworthy that an uncle, after being "blind," became so much better, that he could resume ordinary occupations, but this has not been the case in any other affected member of the family. The patients deny any consanguineous marriages. The following genealogical table exhibits the affected members of the family:

G.g.g.f. — G.g.f. — G. m. (affected). (affected). (affected).	Uncle (affected, but improved).	Cousin (affected).
	Mother (not affected).	1. A. H. A. (patient), male, 49 yrs. (affected). 2. Female, 46 years (not affected). 3. Died in infancy. 4. Male, 43 years (affected). 5. Died in infancy. 6. Died in infancy. 7. Female, 33 years (not affected). 8. Died in infancy. 9. Died in infancy.
	Aunt (affected).	Cousin, patient C. H. K., male (affected).

These cases form, to a great extent, a complement and contrast to those presented by typical pigment degeneration of the retina. They both have this in common, that they are frequently transmit-

ted from generation to generation, but in the one the affection starts always after puberty, often in middle life, with a neuritic atrophy of the optic nerve, and cuts off the central vision at the start, while peripheral vision remains comparatively unaffected. In the other, we have also an hereditary affection of the nervous system, localizing itself in the periphery of the retina often early in life, producing a secondary atrophy of the optic nerve and leaving central vision intact often for many years. Both are said frequently to arise from consanguineous marriages, but both often exist without any such cause.

Most of the individuals of this series became affected between the ages of twenty-five and forty years. The two who were my patients were much benefited by the persistent use of strychnia, which, although it failed to remove the central scotoma, so improved their peripheral vision that they could get about far more comfortably.

Treatment, however, in the great majority of recorded cases, has been unsatisfactory, and very different treatment seems to have succeeded in the hands of different individuals, showing either that the recorded improvements were the natural course of the disease uninfluenced by medication, or, what is more probable, that the various groups of cases are really different in their nature, and that we must endeavor by careful clinical study to further differentiate them. Thus Leber,[1] who has given us a most careful study of this subject and a *résumé* of its literature, remarks, that in his hands, even in the cases which subsequently improved, strychnia has been totally without effect. He recommends mercurial inunctions, and states that he once saw marked improvement after galvanization of the sympathetic in the neck—a proceeding which, however, in other cases proved unavailing. Graefe[2] saw marked improvement from systematic sweating, and Mooren[3] records the only complete cure with which I am familiar, obtained in a patient who came to him two weeks after the commencement of the affection, where, after five months' complete rest of the eyes, and the application of setons to the back of the neck, nitrate of silver was administered with such effect that the patient was able again without effort to read Jaeger 1 with either eye.

[1] Arch. f. O., XVII., ii., pp. 249–291; and later in Graefe and Sämisch's Handbuch der Augenheilkunde, Vol. V., pp. 824–828.

[2] Graefe, A. f. O., IV., ii., pp. 266–268.

[3] Mooren, Ophthalmologische Mittheilungen, 1873, p. 88.

I cannot, however, but believe that in these, as in almost all other atrophies, that a certain degree of improvement in the *peripheral* vision is to be obtained by the persistent use of strychnia, and that *it is due not to any specific action on the nervous system, but to the fact that it so increases arterial pressure, as to drive a greater supply of blood into the shrunken capillary vessels of the optic nerve and retina, and thus restore proper nutriment to tissues which have been to a greater or less degree in a state of starvation.*[1]

REMARKS.

THE PRESIDENT remarked that the subject was one of considerable interest. A genealogical table was given in the last number of the new British *Journal of Ophthalmoscopic Science* of four generations of patients afflicted with retinitis pigmentosa, most of them minors.

DR. HARLAN, of Philadelphia, said that in the Institution for the Blind, in Philadelphia, there were patients in whose family a history of retinitis pigmentosa could be distinctly traced back seven generations.

DR. KIPP, of Newark, N. J., said Mauthner reported cases in which atrophy of the optic nerve was hereditary in a family several generations, but later color-blindness had developed instead of atrophy, while in the last members of the family the eyes were normal.

DR. LITTLE, of Philadelphia, mentioned the case of a family of Wilmington, Del., in which atrophy of the optic nerve could be traced back two or three generations.

[1] It is well known that strychnia is an excito-motor and stimulant to the nervous system, especially to the spinal-motor centres. Richter, however, has shown that it causes a very decided rise in the arterial pressure. Sigmund Mayer confirms this, and shows that the rise in blood-pressure is independent of the convulsions and of the frequency of the heart's action. He concludes that the rise of the arterial pressure is due to vaso-motor spasm. The later experiments of Schlesinger (1874) and Klapp (1878) further substantiate these statements. *Vide* a "Treatise on Therapeutics," H. C. Wood, 4th ed., p. 306.

THE INFLUENCE OF THE FARADIC CURRENT IN THE TREATMENT OF VITREOUS OPACITIES, WITH CASES.

BY WILLIAM S. LITTLE, M.D.,
PHILADELPHIA, PA.

THE presence of extensive vitreous opacities in the eye, while annoying to patients, is at the same time a preventive of an exact diagnosis as to the cause of the trouble, and a prognosis cannot be given till a view of the fundus of the eye is obtained.

While accepted plans of treatment do yield favorable results after a time, yet the sooner the media can be cleared up the better for both patient and physician. In hastening the process of removing vitreous opacities, I have found the Faradic current of value, combining medication with it.

My attention was first called to this in October, 1877, while treating a case of retinitis pigmentosa in a deaf mute, a male, aged fifteen, presenting at birth marks of a specific taint. Both eyes presented the lesion of retinitis pigmentosa to a marked degree. The right eye had a vitreous opacity to the nasal side, restricted in its movements, and the crystalline lens had a posterior polar cataract, slight in extent. I used the Faradic current for the condition of the retina, and with success, using at the same time, internally, iodide of potassium and mercury, and later strychnia. As the battery was used from time to time I observed the opacity in the vitreous of the right eye to decrease rapidly, far more so than where only medication had been resorted to in cases where vitreous opacity existed from various causes.

Since observing the improvement in this case, my note-book affords me the records of twelve cases of vitreous opacities, so serious in character as to prevent useful vision, and in which only medication and leeching has been resorted to, and while good results have been obtained, it took considerable time, the homes of the patients being so distant as to prevent frequent visits for the application of electricity.

During the past winter and spring several cases have afforded me

the opportunity to try the use of the Faradic current in addition to medical treatment, and the result has been more satisfactory as far as the time in treating the cases is concerned, and considerable diminution in the amount of medication.

The interrupted current has only been taken advantage of; the influence the constant current might have has not been attempted.

The cases which are here reported are those where the vitreous opacities were due to change in the retinal or choroidal circulation. That it would be valuable in any form of hyalitis I have no doubt, and would suggest the application of the Faradic current to those cases having vitreous opacities from changes in the eye due to myopia, and in those cases of vitreous opacities from presence of foreign bodies in the eye, so as to clear up the vitreous to enable a view of the fundus, so as to locate the foreign body, or see the damage done before enucleation, if that is required.

Carnus Henri, Thèse de Paris, 1874, reports the advantage of the constant current in opacities of the vitreous (Jahresbericht, 1875, published 1877, p. 193, eight cases treated).

Dor reports the good result of electricity in retinitis pigmentosa (Jahresbericht, 1872, published 1874, p. 380; also in Jahresbericht, 1877, published 1880, p. 198).

The improvement in the cases treated by electricity is not due to the stimulation of the nerve or retina, that of course being done, but to actual diminution of the opacities in the vitreous; as the improvement in vision remains constant and as it clears up, the ophthalmoscope can be used to see the improvement in reduction of their size and density, till a good view of the fundus is at last attained. The time required varies according to the size and density of the opacities. I have found one, two, or three weeks all that is necessary, application being made every other day, feeble at first, and gradually increased in length of time of application, and amount of electricity used, the applications being made from one hand and to the eyeball on the same side, or from the hand of the opposite side, or one pole can be applied to the nape of the neck, the other on the eyeball.

Four cases are reported recently under treatment.

Case I.—J. F. D., male, aged twenty-nine; physician; Pennsylvania; seen February 17, 1882. In December, 1881, suffered from attack of diphtheria; confined to bed for one week; second day of attack the left eyeball became troublesome, sclerotic injected, intolerance of light and gradual loss of sight. Vision same now as at the worst; used atropia. Ophthalmoscope gives only slight reflex.

R. E., V.=$\frac{20}{XX}$ H+60, field normal. L. E., V.=$\frac{1}{CC}$, field normal.

The vitreous was opaque and gave very dark reflex.

Potassii iodid. and hydrarg. bichlor. were ordered. Leeches to the temple. I advised also the application of a weak Faradic current to the eye every other day. Patient returned April 6, 1882; there had been a rapid improvement in vision.

L. E., V.=$\frac{15}{XL}$.

Floculi through vitreous; can see fundus so as to exclude any serious lesion of nerve or retina. July 29, 1882, writes nearly returned to normal vision; reads newspaper easily.

CASE II.—R. W., female, aged thirty-six; Pennsylvania. During June, 1881, compelled to give up work on account of general health and visual trouble: had suffered from rheumatism, sore throat; hair fallen out. Attack of Bell's palsy on right side; cornea affected, as seen by opacities now present. A few weeks later the left side was attacked with Bell's palsy, as the right side was getting better.

Vision had failed since the right eye was first attacked. Appropriate treatment was given by a capable physician.

No specific history made out. Severe pain in head at times, hearing was modified and taste also, sense of smell reduced.

R. E., V.=$\frac{15}{C}$; cannot continue near work or read. L. E., V.=$\frac{15}{C}$; cannot continue near work or read.

Ophthalmoscope reveals large opacities in vitreous, preventing view of fundus in each eye. Potassii iod. and hydrarg. bichlor. ordered.

April 6th, applied Faradic current. R. E., V.=$\frac{15}{L}$; after battery, $\frac{15}{XX}$. L. E., V.=$\frac{15}{LXX}$; after battery, $\frac{15}{XXX}$.

April 8th.—R. E., $\frac{15}{XX}$; after battery, $\frac{15}{XV}$. L. E., $\frac{15}{XXX}$; after battery, $\frac{15}{XX}$. Snellen 0.8 at 12."

April 11th.—R. E., $\frac{15}{XX}$; after battery, $\frac{15}{XV}$; three letters in line. L. E., $\frac{15}{L}$; after battery, $\frac{15}{XXX}$.

April 14th.—R. E., $\frac{15}{XV}$; after battery, $\frac{15}{XV}$; four letters in line. L. E., $\frac{15}{XXX}$; after battery, $\frac{15}{XX}$; two letters in line. Ordered strychnia.

April 17th.—R. E., $\frac{15}{XV}$; L. E., $\frac{15}{XX}$; after battery, $\frac{15}{XV}$; one letter.

April 20th.—Says sees much better for far and near all the time. R. E., $\frac{15}{XV}$; after battery, $\frac{15}{XV}$; four letters in line. L. E., $\frac{15}{XX}$; after battery, $\frac{15}{XV}$; three letters in line.

April 24th.—R. E., $\frac{15}{XV}$; four letters in line. L. E., $\frac{15}{XX}$; four letters; after battery, $\frac{15}{X}$; one letter. Says she has been able to do work not done since she was first taken sick. Ophthalmoscope shows disk in each eye distinctly. a+6D shows thin opacities in vitreous.

May 5th.—Corrected in R. E., Ah +.60 cyl. ax. 90°.

May 9th.—Corrected in L. E., Ah +.48 cyl. ax. 90°.

June 15th.—R. E., V.=$\frac{1}{?}$; very fine opacities exist in vitreous. L. E., V.=$\frac{1}{?}$; slight opacities exist in vitreous.

July 6th.—Her vision is the same; hearing better; taste and smell as acute as ever.

Case III.—W. F. C., male, aged thirty, New Jersey; Jefferson Medical College Hospital. Seen March 31, 1882. Suffered from sunstroke three years ago, vision bad since. Has an eruption over face and about the body, which has been present almost continually since childhood. Denies specific taint. No glasses help him in seeing; is unable to read or write, as the words are lost as he views them.

Posterior polar cataract exists in each eye; also large, dense vitreous opacities are present in each eye; no view of the fundus of either eye obtainable with the ophthalmoscope. Some pain in eye last three months. Potassii iodid. given.

April 5th.—R. E., V.=$\frac{20}{LXX}$. L. E., V.=$\frac{20}{C}$ ($\frac{20}{LXX}$?).

April 7th.—R. E., V.=$\frac{15}{XV}$; after battery, $\frac{15}{XV}$; letter 0.5 at 12″. L. E., V.=$\frac{15}{L}$; after battery, $\frac{15}{XXX}$; letter 1.25 at 6″.

April 10th.—R. E., V.=$\frac{1}{?}$; after battery, $\frac{1}{?}$. L. E., V.=$\frac{15}{L}$; after battery, $\frac{15}{XL}$.

April 14th.—R. E., V.=$\frac{15}{XV}$; after battery, $\frac{15}{XV}$. L. E., V.=$\frac{15}{XL}$; after battery, $\frac{15}{XXX}$.

April 17th.—R. E., V.=$\frac{15}{XV}$. L. E., V.=$\frac{1}{?}$; after battery, $\frac{1}{?}$.

April 20th.—R. E., V.=$\frac{15}{XV}$. L. E., V.=$\frac{15}{XXX}$; after battery, $\frac{15}{XX}$.

April 24th.—R. E., V.=$\frac{15}{XV}$. L. E., V.=$\frac{15}{XX}$.

April 28th.—R. E., V.=$\frac{15}{XV}$, H+48. L. E., V.=$\frac{15}{XX}$, H+48.

Been able to observe change in choroid and retina since April 14th, in the left eye existing at the fovea.

Vitreous cleared so as to examine the fundus of each eye perfectly with the ophthalmoscope.

The changes in posterior portion of lens are annoying.

May 13th.—R. E., +48, V.=$\frac{?}{XX}$. L. E., +48, V.=$\frac{?}{XX}$.

Is able to read and write without discomfort, and is doing his work, that of a station-agent on the railroad.

Case IV.—Mrs. W., aged forty-seven; Pennsylvania. Seen June 1, 1882.

R. E. enucleated June 5, 1882, having been lost by a blow some years ago; had no perception of light. L. E., V.=$\frac{?}{CC}$ with −3 worn now some time. Large vitreous opacities exist in the left eye, and changes in the fundus due to the myopia. Given potassii iodid.

June 10th.—Find—2⊃—6, cyl. ax., 70°; V.=$\frac{5}{LXX}$.

Applied the battery June 17th. V.=$\frac{15}{CC}$.

As she returned home, could not be used.

Seen August 16th. L. E., V.=$\frac{15}{CC}$ or $\frac{5}{XL}$.

Reads Snellen 1.25 at 12″.

Vitreous is much clearer, but changes due to posterior staphyloma prevent any further improvement. The left eye is much stronger since enucleation of the right eye.

REMARKS.

DR. JOHN GREEN, of St. Louis, referred to the case of a woman who had received specific treatment, on whom he used at first the weak Faradic current, and afterward a stronger one, for opacities of the vitreous. It was rather astonishing to note the improvement which took place from the beginning of the treatment.

THE PRESIDENT remarked that we all knew how difficult it was to cause contraction of the recti muscles of the eye by the Faradic current, and the question arose in his mind, how deeply the current entered during its employment in this manner.

REPORT OF A CASE OF GLIOMA IN A PATIENT TWENTY-ONE YEARS OF AGE.

BY C. S. MERRILL, M.D.,

ALBANY, N. Y.

THE occurrence of glioma of the retina in a patient at so advanced an age, twenty-one years, makes it seem proper that this case should be recorded; therefore I present it for your consideration.

George S., of Binghamton, twenty-one years of age, a cigar-maker, small of stature, but always enjoying good health, presented himself at the Albany Hospital, October 2, 1878, stating that fourteen months before he had noticed a cloud coming over left eye, shutting off the outer and upper portion of the field of vision. In the course of ten months the entire field was covered, and the eye had lost all perception of light. He stated that for the last ten months he had had, at times, severe pain in the eye.

The tension was not increased. The ophthalmoscopic appearances were most interesting and remarkable.

There was complete detachment of the retina, which hung in cir-

cular folds, and presented the characteristic yellowish appearance of glioma.

I diagnosed the case as one of glioma, and advised enucleation of the eye. Knowing that there was no case on record in the literature of the subject of glioma occurring at so advanced an age, I requested the man to go to New York and see others. He did so, and there saw Drs. Agnew, Webster, and Knapp.

Dr. Knapp, in a letter written Dr. Agnew concerning the case, stated that he considered it as probably one of glioma, though he was not willing to express a definite opinion from the one examination.

Dr. Agnew was disposed to consider it a mixture of glioma and sarcoma. Both concurred in advising enucleation.

On November 15th, I removed the eye before my class. A portion of the greatly thickened retina was given Dr. William Hailes, for microscopical examination, who pronounced it a case of pure glioma.

The eye was treated with Müller fluid, after which Dr. Hailes made a further examination, and in his report says: "I find the growth to consist almost entirely of small round cells, bordered by remnants of the retinal elements, more or less recognizable. A section of optic nerve posterior to sclera shows the nerve at that point to be entirely free of glioma cells. The growth developed from the retina, and possesses the characteristic structure of a glioma."

The removal of the eye relieved all pain, and there has been on return of the growth. I saw the patient for the last time two years ago, when there were no evidences of return, and V. of right eye was as it had been from the first, $\frac{20}{XX}$.

I wrote to the patient last week and received an answer from his sister, saying that his health had continued perfectly good till about a year ago, when he developed lung trouble—phthisis—has rapidly failed, and is expected to live but a few days.

In his right eye, when he was first seen, there were three or four peculiar grayish-white patches in the periphery of the fundus, which, I feared, might be the beginning of similar trouble in that eye; but, after the removal of the left eye, they almost entirely disappeared. One year later they were very marked. In two months they nearly disappeared again, while using mercury, and as far as I know never returned.

A CASE OF ANÆSTHESIA OF THE RETINA, WITH CONCENTRIC LIMITATIONS OF THE FIELDS OF VISION—RECOVERY THROUGH INHALATIONS OF NITRITE OF AMYL.

BY RICHARD H. DERBY, M.D.,

NEW YORK.

PATIENT, Helen P., aged eight; a nervous, excitable child; grown rapidly in last year especially; has recently convalesced from severe attack of scarlet fever. Was brought to me March 30, 1882, complaining of pain in and about the eyes and defective sight.

Vision, O. D. (Monoyer) .6. O. S. .5. The next day eyes examined under atropine. Vision as before; no improvement with glass. On each eye very marked concentric limitations of the fields.

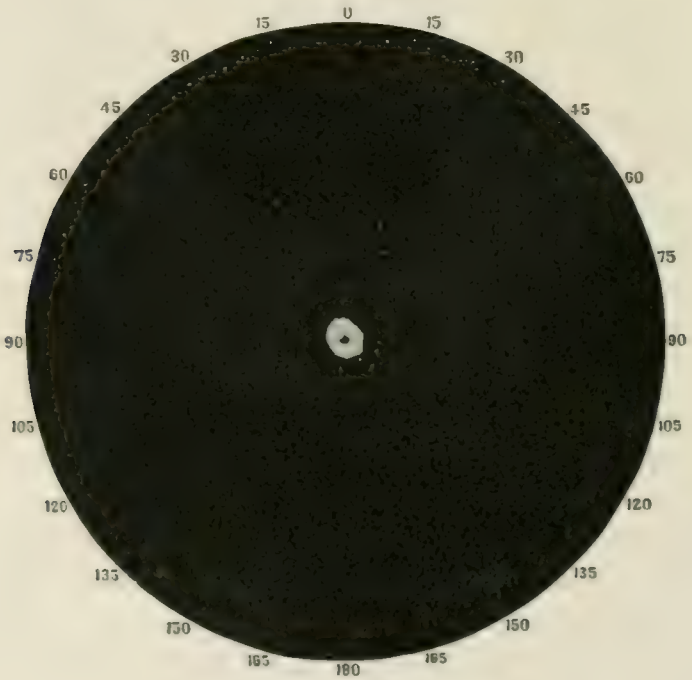


FIG. 1.

By the perimeter the vertical and horizontal diameters of the fields not exceeding 10° (Fig. 1); with the ophthalmoscope no change noted. Patient was given small doses of oxide of zinc, and directed to wear coquilles.

On April 5th, Vision O. U.=.4.

On April 10th, Vision O. U.=.5.

On June 1st, patient's mother reported her vision worse; that the child stumbled over pieces of furniture in the nursery. Vision O. U. .2; fields of view limited as before; optic discs are paler in their outer halves than before; the papillæ have lost their capillary blush. This fact was confirmed by Dr. E. G. Loring, who examined the case. Upon consultation it was decided to use inhalations of nitrite of amyl. An inhalation of three drops of nitrite of amyl was given, followed by marked flushing of face; no change in vision.

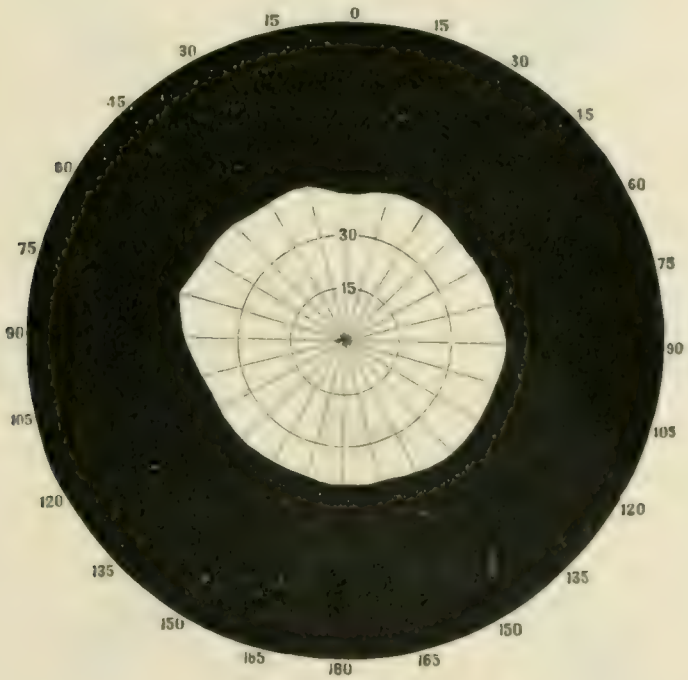


FIG. 2.

June 2d.—Vision O. U. .2; again amyl inhalations; after this, Vision =.3 (?). Patient complains of pain over top of head, and that she cannot bear the contact of comb with scalp. The nitrite of amyl inhalations continued daily (three drops).

June 3d.—Vision =.3 (four letters).

June 8th.—Vision =.6; the right visual field found enlarged; after measuring this with the perimeter, vision of this eye after inhalation .8 nearly.

June 9th.—Vision .9 nearly.

June 10th.—Vision 1; again enlargement of field (Fig. 2).

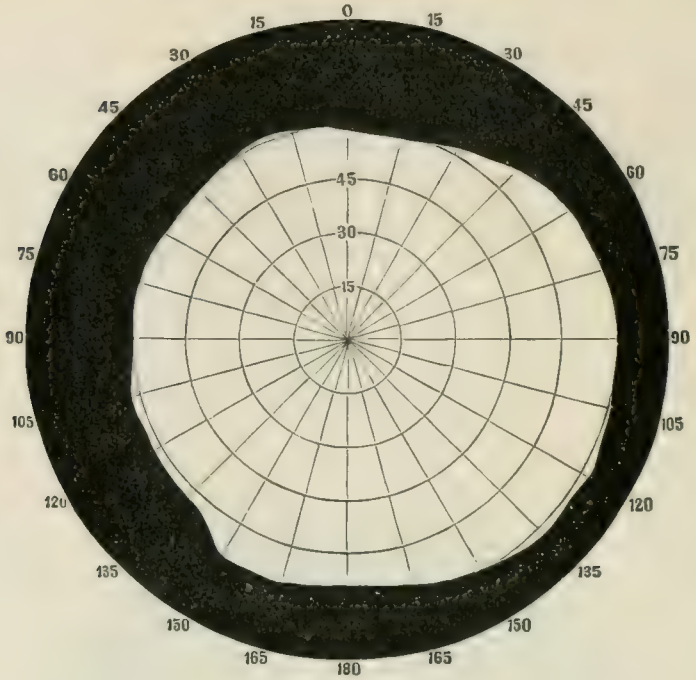


FIG. 3.

June 12th.—Field of vision enlarged (Fig. 3).

June 19th.—For several days patient has been in the country; fields of view normal (Fig. 4); Vision 1. The perimetric diagrams

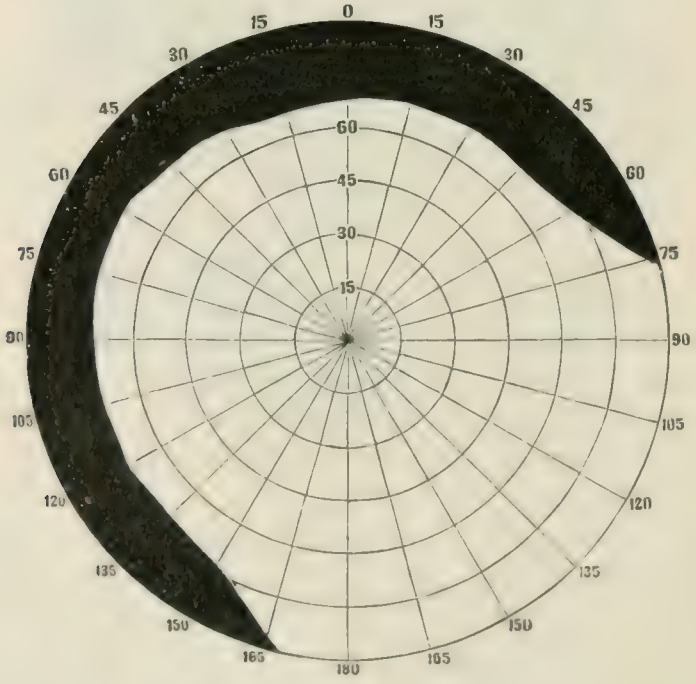


FIG. 4.

of the field of view are all of the left eye, but at no time was there a marked difference of the two visual fields.

In this case the interesting feature is, the very marked depreciation of vision, the unusual degree of concentric limitation of the fields, both persisting for two months or more, and the relief following the use of nitrite of amyl, and that relief maintained. Cases of anæsthesia of a zone of the retina are by no means uncommon; they occur ordinarily among children, and as a consequence of scarlet fever, they have been frequently noted.

That which gives the present case whatever interest it may have, is the persistence of the trouble, the signs of partial atrophy of the optic nerve, and the prompt clearing up of the difficulty under nitrite of amyl.

Of the use of nitrite of amyl in cases of anæsthesia of the retina I can find nothing in literature. Oscar Berger[1] relates the case of a lady, twenty-four years of age, who suffered from left-sided migraine at the period of menstruation and occasionally between periods, the attacks beginning usually in the morning, reaching their height at noon, with vomiting, the migraine lasting until night. In one of these paroxysms patient inhaled five drops of amyl and the pain was banished at once (weggebannt).

The use of the amyl in the partial temporary blindness (Flimmer—scotoma), familiar to all ophthalmic surgeons in these cases of migraine, suggests itself at once, as does its use in certain cases of cerebral amblyopia, of which the following, from my private case book, may be taken as a type: Judge R., aged fifty-nine, eight days before consulting me first noticed right-sided hemiopia; patient always myopic, reads without glasses. There was defect of visual fields or uncertainty in every direction. Patient said, "I can only read by following on letter by letter, but I cannot see the whole of words." The history of the case was one of occasional alcoholic abuse, and at times great mental strain. He had unnatural pallor of face, was disposed to sleep at all hours. Examination of urine showed nothing abnormal. Beyond a slight posterior staphyloma *there was no ophthalmoscopic change.* The central vision reduced to $\frac{1}{2}$. Under use of Heurteloups at temple and tonic treatment patient recovered the integrity of visual fields and the vision rose to .7, the treatment lasting a period of nearly three months.

Whether or not in this and similar cases we have to do with capil-

[1] Berlin. klin. Wochenschr., January 9, 1871, p. 21.

lary contraction and consequent interference with nutrition of the nervous centres, may well be a matter of speculation. Further experiments are certainly justified in the use of an agent which, in the case here narrated, clearly was efficient in bringing prompt relief.

REMARKS.

DR. HARLAN said that he had no experience in the use of nitrite of amyl in anæsthesia of the retina, but could refer to a case in which it had been used with great success in hyperæsthesia. The patient was a nervous girl about eighteen years of age, who, without any disease of the eyes, had such intense photophobia that it was impossible to see even the cornea without etherization. Ophthalmoscopic examination under ether showed the fundus to be normal. After trying every remedy that he could think of, or that could be suggested by his colleagues at the Wills Hospital, where the girl was under treatment for a year, she was entirely cured by three or four inhalations of the nitrite. It was administered by the resident surgeon, in larger doses than he should, at that time, have ventured to use—of one drachm each. He had tried the remedy in other cases, but without effect.

DR. S. D. RISLEY, of Philadelphia, had not had experience with this drug in anæsthesia or hyperæsthesia of the retina, but he had used it in overcoming photophobia from corneal disease in a number of instances in children. In the case of a man with granular lids and corneal disease, with excessive photophobia, the relief was so great immediately on inhaling it that he could look out of a very light window. But the dread of light would return within an hour.

THE PRESIDENT referred to a case which he reported to the New York Ophthalmological Society in the spring of this year. A mechanic, fifty-five years of age, while talking, gradually began to lose sight. Everything grew dark, and in about ten minutes he was blind, and had to be led home. He continued in this state of complete want of perception of light from 2 P.M. until nearly 6 A.M. At 2 P.M., twenty-four hours after he lost sight, he was brought to the infirmary, where the president saw him. He was able to recognize light, and had a dim perception of form. After careful examination with the ophthalmoscope he pronounced the man to be suffering from what was formerly called palsy of the retina. There was almost entire suspension of the retinal circulation. V. $\frac{2}{C}$. He was put under the influence of nitrite of amyl, and in five minutes he had completely recovered. V. $\frac{20}{XX}$.

The President also narrated a case, asking the members if they had had any similar experience. A child in Chicago had an extremely mild attack of scarlet fever, from which it soon recovered, afterward suffering from a certain amount of conjunctival trouble. Dr. Lyman Ware, of Chicago, was consulted, who told the parents that the child had retinitis. Later, the child was brought East, when

the president saw it, and found a typical case of papillitis, choked disk; V. $\frac{20}{20}$. No limitation of field, no impairment of ocular perception, no albuminuria or kidney trouble, no headache, no constitutional trouble. It was the only case he had seen of double papillitis succeeding scarlet fever without symptoms of kidney trouble or with perfect general health. Dr. Knapp remarked that a similar case had been reported to this society, but he was unable to say whether the patient had had scarlet fever or whether it was measles.

Dr. Hasket Derby, of Boston, mentioned the case of a young man, aged eighteen, who, under ophthalmoscopic examination, was found to have the condition the president described. It was a beautiful case of choked disk; the outline of the disk had entirely disappeared. There was no effect upon the field of vision; V. $\frac{20}{20}$. in each eye. Perfect sight. No constitutional symptoms. The papilla had not returned to its normal condition when he saw the patient last.

Dr. L. Howe, of Buffalo, N. Y., spoke with regard to what might be attributed to the medicine given, and what to the natural course of things when relief was obtained from palsy of the retina. A certain lady had lost her sight completely, but within eight or ten hours it returned, coming back gradually. Her sight was then practically normal. During the past six weeks, however, she had a return of exactly the same condition. He gave no treatment, thinking a like favorable result would take place. The president here remarked that he had seen a number of cases recover without any interference, but in this case he gave the nitrite of amyl to hasten recovery.

Dr. Risley remarked, with regard to the fact that choked disk might be present and sight still remain perfect, that he had examined a large number of persons whose sight was said to be perfect, and in quite a number he found the typical appearances of choked disk. No complaint was made by them of headache, of asthenopia, or diminution in sharpness of vision.

REMAINS OF THE HYALOID ARTERY ATTACHED TO THE CRYSTALLINE LENS—ANÆSTHESIA OF THE RETINA.

By W. S. LITTLE, M.D.,
PHILADELPHIA, PA.

Miss W., aged twenty, was seen at the Jefferson Medical College Hospital, Eye Department, on November 29, 1881. Had been compelled to give up her work, that of a weaver, and also clerical work afterward adopted, on account of her poor vision.

R. E., V. = $\frac{7}{CC}$; peripheral limitation of field. L. E., V. = $\frac{15}{C}$; peripheral limitation of field.

Blepherospasm and photophobia were present to a limited degree.

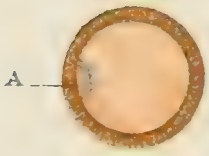
Stated her eyes had been sore when five years of age; shows now no trace of disease that then existed.

The symptoms she had been suffering from for some months were attributable to hysterical copiopia.

The first ophthalmoscopic examination showed remains of the hyaloid artery in the right eye attached to the crystalline lens; between the optic nerve and the crystalline lens it was oscillating, the central vessel passing from the nerve directly to the posterior surface of the crystalline lens contained a dark material about the middle of its course, only the adventitia of the vessel was present elsewhere; it appeared as a delicate piece of lace-work, except where pigmented, against the red fundus for a background.

The general course of the vessel is nearly the same as occurred in the case of persistent hyaloid artery I reported, and the chromo-lithograph of which appears in the "Transactions of the American Ophthalmological Society" for the year 1881, only in that case the attachment to the crystalline lens was wanting, and blood was traversing the vessel.

The observation of this case now described gives me more confidence in asserting the other case as being a true persistent hyaloid artery, and the two cases taken together are quite unique. The vision was not impaired in either case to any extent by the presence of the vessel.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The left eye of this same patient shows slight traces of the adventitia of the hyaloid artery close to the disc.

Dr. J. Madison Taylor, of Philadelphia, Pa., has made a very accurate drawing of the case, a colored drawing of which I present to the society.

A detailed course of the vessel is not necessary.

Under a mydriatic, I found R. E., +48, cyl. ax. 90°, V.=$\frac{20}{xx}$, field limited. L. E., +60, cyl. ax. 90°, V.=$\frac{20}{xx}$, field limited.

The case remained under observation and treatment for some weeks, her vision still being defective; her family physician reported no uterine trouble. Shortly afterward she was married, and she came to see me soon after her wedding trip, when I found the limitation of the field of vision had vanished, and her sight was again good, she wearing the glasses correcting her optical defect.

Her sister has recently been a patient; myopia exists, and I have observed in her left eye slight traces of the hyaloid vessel close to the disc.

CIRCUMSCRIBED ABSORPTION OF THE LENS, APPARENTLY OF TRAUMATIC ORIGIN, WITHOUT THE REMAINDER OF THE LENS BECOMING OPAQUE.

(With Chromo-lithograph.)

BY SAMUEL THEOBALD, M.D.,

BALTIMORE, MD.

MRS. H., about thirty years of age, sought advice because of a recurrent dimness of sight in the right eye, after prolonged use of it. The eye exhibited no external signs of inflammation. A small dense opacity was observed in the cornea near its outer margin, and to this a slender tag of iris was adherent, the pupil, as a consequence of this, being displaced toward the point of attachment. With this eye the patient had V.=$\frac{20}{xx}$ (?), and could read J. No. 1, the range of accommodation being but little, if at all, less than in the other, and about corresponding with what she was entitled to at her age. A strong solution of atropia having been instilled the pupil dilated promptly, and then with the ophthalmoscope and by oblique illumination the periphery of the lens was seen to be defective, a well-defined crescentic notch being discovered in its margin, in a line

with, and directly behind the corneal scar and iritic adhesion. A layer of opaque lens substance, apparently about $\frac{1}{4}$ mm. in thickness, formed the boundary of the notch, and beyond this, but in close proximity to it, there were several small punctate opacities; none of these, however, were opposite the area of the undilated pupil, and the rest of the lens was of normal transparency. The fundus of the eye could be seen with the ophthalmoscope either through the notch or through the lens; it exhibited no pathological changes, but several floating opacities were discovered in the anterior portion of the vitreous humor.

The patient had no knowledge of this eye ever having been injured, nevertheless there seems to be little room for doubt that the corneal scar, the anterior synechia, and the circumscribed absorption of the lens were the result of a penetrating wound—received, probably, in childhood—which involved the capsule of the lens as well as the cornea and iris. Why the cataractous process should have been arrested in so singular a manner is a question difficult of explanation.

Atropia was prescribed, in the hope of tearing through the slender iritic adhesion, and so improving the condition of the eye, but the patient becoming alarmed at the effect it produced upon her accommodation, discontinued its use after a day or two, and nothing was accomplished by it.

REMARKS.

In reply to a question by Dr. Kipp, whether this crescentic notch in the lens might not have been congenital, DR. THEOBALD replied that while that possibility could not be excluded he did not think it was the probable explanation in this case; doubtless it was a scar of traumatic origin.

DR. KNAPP remarked that there sometimes seemed to occur a disturbance of development, resulting in an adhesion between the cornea, iris, and lens, forming a notch in the lens with a kind of partial cataract, presenting the appearance described by Dr. Theobald, and he would rather be disposed to leave the question an open one, whether this case were of congenital or traumatic origin. In reply to a question by the president, whether these notches in the lens were not more likely to occur in the vertical margin than in any other portion of the lens, Dr. Knapp replied that he had not so found it as a rule.

In reply to a question, THE PRESIDENT said he had seen persons who were born with inflammation of the iris, posterior synechia, and opacity of the cornea.

A FRAGMENT OF GLASS IN THE EYE, PROBABLY IN THE CILIARY BODY, FOR TEN YEARS, WITHOUT PRODUCING SERIOUS CONSEQUENCES.

BY SAMUEL THEOBALD, M.D.,
BALTIMORE, MD.

JUNE 5, 1872.—Mr. W., twenty-one years of age, hastened to my office because of an injury which he had just received to the left eye, from the accidental explosion of a glass test-tube, with which he was engaged in making some experiments. Upon examination by oblique illumination a small penetrating wound was discovered in the upper and outer margin of the cornea, and attached to the inner extremity of this by a slender shred of tissue, dangling in the anterior chamber, was seen a tiny, irregularly shaped fragment of glass. It hung on a level with the lower margin of the pupil, and rested at one moment upon the lens, and at another upon the iris, as the pupil varied in size. A drop of atropia having been instilled, after an interval of five or six minutes the eye was again examined. The pupil had just begun to dilate—*and the fragment of glass had disappeared.* It had evidently fallen through the pupil, behind the iris, for diligent search failed to discover it in the anterior chamber. Although it could not be seen in its new position, it was clear that, through its gravity, it had found a lodgement below, in the ciliary body.

In view of the serious apprehensions excited by this misadventure, but little surprise was felt when the eye was found on the following morning—in spite of a one-grain solution of atropia, which had been prescribed—decidedly more injected and markedly photophobic. A four-grain solution of atropia, to be instilled every three hours, with ice-water compresses and a mercurial purgative, were now prescribed; but, notwithstanding these remedies, and the application the next day of the artificial leech, and the use of a fomentation of belladonna, the condition of the eye grew steadily worse until June 10th, five days after the accident. The patient was then suffering considerable pain; the eye was much injected; its vision had fallen to $\frac{2}{XX}$, its tension to —T. 1, and there was decided

tenderness of the ciliary region; in addition to which there was, for the first time, a muddiness observable in the lower portion of the iris. However, though the patient had taken but four grains of calomel in the two purgative powders which had been administered, he now complained of a bad taste in his mouth, and of an unusual inclination to spit. I mention this fact because, if it were not connected with the cause, it was at least the precursor of the pronounced change for the better in the condition of the eye which manifested itself during the next twenty-four hours, for the day after the eye was free from pain; V. had improved to $\frac{20}{XXX}$, T. was nearly normal, and the tenderness of the ciliary region had greatly diminished. In the treatment no change had been made, except the application of cantharidal collodion behind each ear.

From this time on the eye rapidly improved, and on the twenty-first day after the receipt of the injury—all treatment having been discontinued a week previous—it was entirely free from inflammation, had V.$=\frac{20}{XX}$, and could make out J. No. 1 with ease. The ophthalmoscope showed a clear lens and a healthy fundus, but the fragment of glass could not be detected. An examination made twelve months later, and still another, two years after the injury, showed no change in the condition of the eye.

To complete this report I have again, within the past few days, carefully re-examined the eye, without finding any trace of the old hurt, except a scarcely perceptible opacity at the site of the corneal wound. V. is still $\frac{20}{XX}$, and J. No. 1 is read as promptly with this eye as with the other; indeed, Mr. W. was in some doubt as to which of his eyes had been injured, and assured me that he was conscious of no difference between the two. Doubtless the inflammation, which followed immediately after the accident, caused the fragment of glass to become encysted, and to this, as well as to the chemical nature of the glass, may be ascribed the exceptionally favorable progress of the case.

REMARKS.

DR. JOHN GREEN, of St. Louis, saw a man in whom a piece of percussion-cap had lain in the lens, a little to one side, for many months without producing general opacity. The line of demarcation was very clearly observable, and the foreign body on casual inspection looked like a wedge. There was a little evidence of atrophy of the pupillary margin at that particular part, as if frequent touching of the point of the object had produced some atrophy of the tissue. The case passed from under his observation.

Dr. T. R. Pooley, of New York, was reminded by Dr. Knapp of a case he saw a few days ago, similar to the one described by the author. A fragment of glass was apparently imbedded in the structure of the iris, situated midway between the pupil and the attached margin of the iris. It was triangular in shape, about three millimetres in size, and the accident occurred about twenty years ago, when the patient was engaged as a glazier. It had given exceedingly slight trouble from time to time, and on this occasion the patient consulted him because of a little redness of the eye. The foreign body could be removed, but there was no indication for it.

Dr. Knapp, of New York, thought the tolerance or intolerance of foreign bodies in the eyes depended more upon their size than upon other conditions. The danger from uncleanliness was, in his opinion, commonly exaggerated. Unless they were chemically destructive or composed of an irritant substance, we frequently saw that the most different kinds of foreign bodies were tolerated in the eye.

The President said that last winter a patient was presented to the New York Ophthalmological Society, in whose lens was imbedded a piece of iron which had penetrated the cornea seventeen years before. Every now and then some physician wished to remove it, but fortunately none had had the opportunity to do so yet.

Dr. C. J. Kipp, of Newark, N. J., had under care a practitioner of medicine, in whose retina probably was a piece of percussion cap about the size of a millimetre, which had remained there about eighteen years without causing irritation or affecting the sight.

The President said, in connection with Dr. Knapp's remark, that he had to enucleate the eye of a boy which had been penetrated by a piece of copper percussion-cap, the piece lodging in the lens, causing total absorption of the lens substance, exciting cyclitis, which led to the operation lest sympathetic trouble should develop in the other eye.

Dr. Knapp here remarked that he did not say all small bodies were innoxious, but that in order to be innoxious they, as a rule, must be small.

A CASE OF EXTENSIVE HEMORRHAGE BETWEEN CHOROID AND SCLEROTIC.

BY G. HAY, M.D.,
BOSTON, MASS.

MR. ——, aged fifty-six, had generally enjoyed fair health, though occasionally had had dyspepsia.

He was first seen by me May 21st. The right eye presented extensive ecchymosis of the bulbar conjunctiva. The affection had begun a few days previously with serous chemosis of this part, and some of its vessels enlarged. The eye was not hard; its vision said to be good. The ophthalmoscope showed the media clear and no synechiæ. The pupil had been dilated by atropine.

May 30th.—No appearance of serous chemosis. The ecchymosis less. The patient in good spirits. The case seemed to be improving.

June 1st.—I was again asked to see the case. The patient spoke of some soreness in the region of the malar bone. The upper lid was slightly swollen. The bulbar conjunctiva much injected. Tension full, but hardly too much. Pupil somewhat dilated from the previous atropine, now discontinued. Says he sees with the eye, but, on being questioned, not quite as clearly as with the other.

June 4th.—Had pain about the eye last night. Now, more serous chemosis; bulbar conjunctiva still injected. Some slight discoloration of anterior chamber. Pupil as on the other side. Vision not as good as that of the other eye. Patient seems feeble.

June 6th.—Medial aspect of bulbar conjunctiva seems somewhat thickened.

June 8th.—By ophthalmoscopic examination the pupil does not light up as well as the other, and does not dilate as well.

June 10th.—Under atropine, patient looking up, the ophthalmoscope shows a somewhat globular, rather large, grayish swelling coming into view from above. When patient looks down, a dark mass, less sharply defined, appears from below.

As the case was unusual, it was thought proper to get additional opinions. The patient consulted Drs. Derby and Wadsworth, each

of whom considered the case to be one of intraocular tumor. I also adopted this view, as focal illumination showed at the upper part of the inside of the eye a surface which appeared stationary, somewhat raised from the normal position of the choroid, slightly uneven, and finely mottled with red and yellow.

It should be added that Drs. Derby and Wadsworth each saw a vessel on the upper mass.

June 13th.—The eye was enucleated and placed in Mueller's fluid. On the 26th, the specimen, opened by a nearly vertical section, showed the anterior half of the choroid separated from the sclerotic very extensively all around, not merely above and below, by a layer of blood which was in some parts three-sixteenths of an inch thick, and extended between the membranes into the posterior half of the eye, where it gradually became less thick.

I am indebted to Dr. Wadsworth for the following measurements: The separation extended from attachment of ciliary muscle to within about 10 mm. from the disc; the thickest part was about 10 mm. from attachment of ciliary muscle, and the thickness was there, above and below $5\frac{1}{2}$ mm.; the separation extended all around, but at the outer side and inner side was much less—especially less on the outer side.

The combination of symptoms in this case is rare—choroidal separation is rare. When a separation of the choroid is owing to the effusion of a serous fluid, it may, if the ciliary region is not involved, be easier to recognize. But when it is caused by the interposition of blood, the intraocular appearances may resemble those of choroidal tumor.

In the case reported it may be thought that the conjunctival ecchymosis might have indicated the real nature of the intraocular affection, and yet the question presented itself whether a tumor, or some other disease of the ciliary body, might not give rise to the external ecchymosis.

As to the apparent rapid growth of the supposed tumor, we might have supposed an exceptionally rapid growth, complicated, perhaps, with hemorrhage.

REMARKS.

Dr. Knapp, of New York, said the case resembled exactly the one which he had described and illustrated in his treatise on intraocular tumors. In that case he fell into the same error in diagnosis, believing it to be a sarcoma, which it resembled so closely by

oblique illumination, presenting the nodular appearance, etc. In that case the error was more liable to occur because of absence of a history of inflammation. We at least learned the lesson to be cautious in these cases.

DR. T. R. POOLEY, of New York, said a similar case to the one described by the author appeared at the New York Eye and Ear Infirmary a good many years ago, and was reported to this society. Both eyes were enucleated for supposed glioma, but were afterward found simply to be affected by a bloody tumor lying between the choroid and retina in either eye.

THE PRESIDENT inquired whether detachment of the choroid from other fluid than blood had been observed by members of the society. It was one of those lesions which were put down in the books, but he could not recall having seen an illustration of it unless it were accompanied by severe inflammatory action. In this connection he would mention a condition which he had repeatedly observed, and which, when he first saw it, deceived him into the belief that there was detachment of the choroid. If one looked into the fundus in some cases of detachment of the retina where the fluid beneath the retina was transparent and perhaps not very abundant, and traced the fluid to a point where it became but a very thin layer, then illuminated the eye obliquely, so that the light came not directly upon the spot being examined, but upon the adjacent portion, a phenomenon was very often produced which, when he first saw it, led him into the belief that it signified detachment of the choroid. The phenomenon observed was difficult to describe. A mesh-work of blood-vessels—manifestly those of the choroid—were thrown into view in a fashion as if one saw it in water. He was not undeceived as to the nature of the condition being choroidal separation, but retinal separation instead, until after watching two or three cases when the effused fluid began to undergo absorption. He was not, however, likely to commit the mistake again.

DR. KNAPP, of New York, was perfectly familiar with the phenomenon mentioned by the president. It was almost a constant phenomenon of incipient detachment of the retina. The image unto which he would liken it was the rippling of water. It varied somewhat in appearance with a change in the position of the mirror. He had mentioned the condition incidentally some years ago, and was surprised that it was not spoken of oftener.

THE PRESIDENT remarked that he had likened the appearance to that of a lot of red worms in a box. It was not of rare occurrence, and simply indicated transparent fluid overlying the choroid.

Fig. 1. 2. 3.

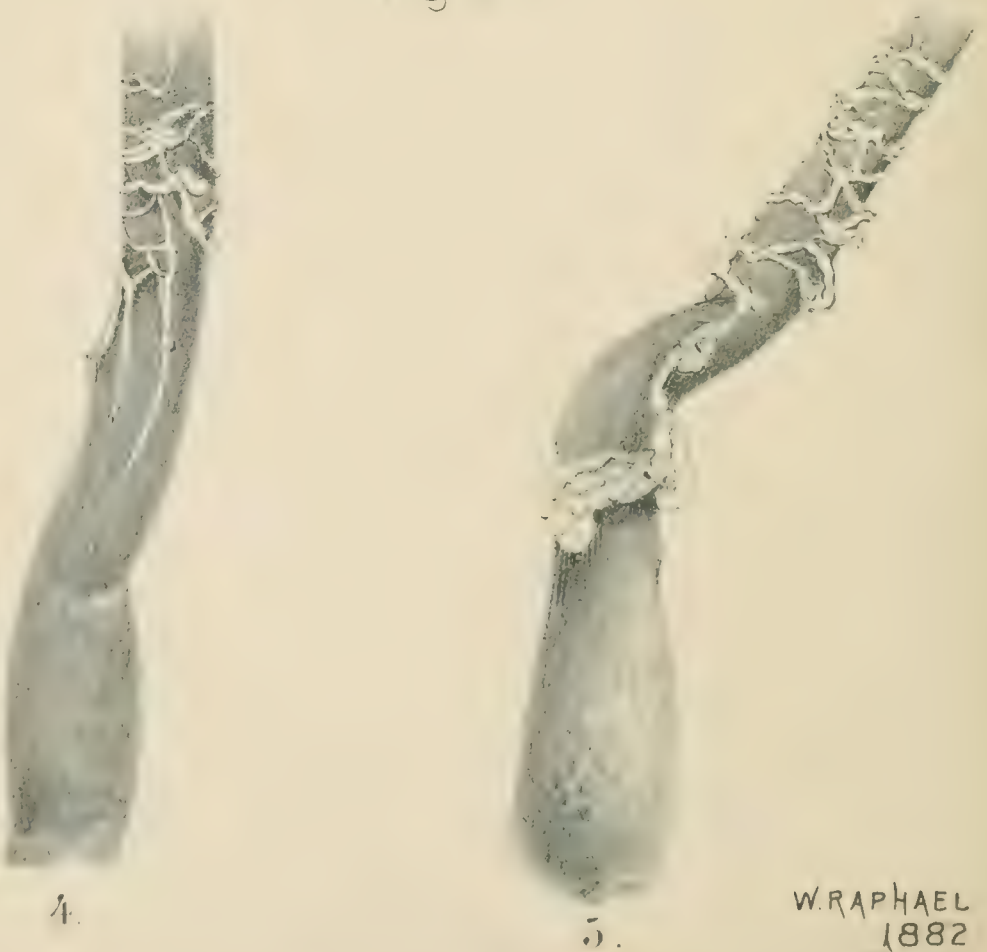
1

2

3

Normal hair with adherent root-sheath.

Fig. 4. 5.



4.

5.

W. RAPHAEL
1882

A PECULIAR CASE OF ALOPECIA OF THE EYELIDS.

(PLATE—FIGS. 1, 2, 3, 4, 5.)

BY F. BULLER, M.D.,
MONTREAL, CAN.

THE microscopic specimens, and the drawings made from them, to which I would call your attention are eyelashes taken from the upper eyelids of a young lady seventeen years of age, who states that for about eighteen months she has noticed something wrong with her eyelashes—that they were falling out from the upper eyelids. For some months the disfigurements from this cause has been quite conspicuous.

She is of somewhat delicate appearance, but enjoys very good health, lives in a healthy locality in the city of Montreal, and her parents are in good circumstances. No other member of the family has ever been affected in the same way. In every other respect the eyes are perfectly normal. The disease is confined to the upper eyelids, the lower lids being provided with a strong growth of healthy lashes.

The edges of the upper lids are neither reddened nor thickened, nor is there any desquamation about the roots of the lashes. She experiences no discomfort, not even itching of the eyelids, and only comes on account of the disfigurement caused by the wasting of the eyelashes.

The left eyelid was first affected, and is the worst of the two, its outer half being almost completely bald; the inner portion has lost fully half its lashes, and those remaining are for the most part small and thin. Some of them, however, are quite short, thick, and dark in color. They are easily pulled out, and she scarcely feels it when they are extracted with forceps, though the extraction of the lower lashes causes the usual amount of discomfort. Most of the lashes, when removed, are seen to have thick, black, knob-like roots.

The right upper lid seems to be provided with about half the normal amount of eyelash. On rubbing the finger along the row, several of the larger lashes appeared to break off on a level with the

skin, and tapered abruptly at the root-end. The others, when pulled out, were similar in every respect to those of the left lid.

Examined under the microscope, the appearance of the eyelashes is striking and peculiar. There are three distinct classes of lashes.

First.—Normal hairs, with normal axis cylinders, the roots and root-bulbs being pale and almost colorless, the root-sheath adherent.

Second.—Dark hairs, thicker toward the root, with interrupted or defective axis cylinders, and in place of a bulb, having a thin spindle-shaped or tapering root.

Third.—Black hairs, with defective or no axis cylinders, large roots and root-bulbs, which are heavily loaded with dark, granular pigment. Most of these are bent like a walking-stick at the junction of the bulb with the shaft, and often peculiarly twisted as if a half turn had been given to the hair at this part.

It will thus be seen that the diseased hairs present opposite conditions as regards the hair-bulbs. In one case there is atrophy, in the other hypertrophy.

The apparent atrophy may be due to absorption of the bulb, or to a softening of its peripheral portions, so that in making the extraction only the central portion of the bulb comes away. The root-sheath of the diseased lashes does not in any case come away with the hair.

The peculiar feature, however, common to both classes of diseased hairs, is the presence of a thread-like material wound around the hair, extending from the bulb to a certain distance up the shaft, but never, so far as I can discover, beyond the point of emergence of the hair from its follicle.

Around the shaft the appearance may be compared to that of a piece of whip-cord loosely woven and knotted, around a walking stick. This simile has been suggested by the bent condition of the hair, in many instances just at the junction of the bulb with the shaft.

In some, as may be seen in Figures 2 and 5, the network apparently commences by several turns of the cord bound tightly around the hair at this part—that is, about the point of junction between bulb and shaft—and one might readily believe this constriction to have something to do with the bending of the hair were it not for the fact that some abnormal hairs are met with bent in a precisely similar manner, but without a trace of the cord-like material around them.

On the other hand, the peculiar arrangement of the network around the shaft of the hair, as well as its appearance when seen in profile at the edge of the hair, raises the question whether it may

not be a mere exaggeration of the normal imbrication of the epithelial structure of the hair at this part (see Fig. 3); indeed, it is not difficult to conceive how a series of epithelial cells, flattened as these, might, by being curled up at their free edges, give rise to an appearance similar to what we here see in so many of the diseased hairs. But this explanation would fail to account for what we see so plainly in Figures 4 and 5.

The network begins in such a way and at such a point that the explanation suggested is out of the question.

The material composing this network is characterized by its indifference to the chemical action of acids and alkalies. Caustic potash in strong solution at most causes it to swell a little, but does not materially alter its appearance.

I have not as yet been able to satisfy myself as to its real nature, but from a clinical standpoint I should say we have to deal with some sort of parasitic growth; if, however, this thread-like structure is actually a fungous growth, it differs very widely from any species of tricophyton hitherto described.

Neither have I succeeded in finding anything I could recognize as fungus spores or conidia, and for this reason, if for none other, I hesitate to place the morbid condition of the eyelashes in the category of parasitic diseases of the hair. Its non-infectious character may be inferred from the complete immunity thus far shown by the lower eyelids. In default of any successful experiments in the cultivation of the fungus—if it be such—the precise nature of the disease must remain a matter of uncertainty.

Since the case has been under my observation, the only treatment employed has been thorough epilation as fast as the growing lashes would admit of removal, and painting the edges of the lids with tincture of iodine. So far the result is entirely negative, recently grown cilia showing exactly the same characters as their predecessors.

REMARKS.

DR. HASKET DERBY, of Boston, asked Dr. Buller whether he had used pilocarpin by subcutaneous injection in any cases of alopecia of the eyelids. It was reported to cause growth of hair to take place on bald places of the scalp and to prevent the hair of the scalp from turning gray.

REMOVAL OF FOREIGN BODIES FROM THE CORNEA.

BY HENRY D. NOYES, M.D.,
NEW YORK.

I HAVE for two years found great comfort in dealing with foreign bodies in the cornea, when I could not call upon an assistant to hold the lens for focal illumination, by having the lens attached to the forefinger of my left hand, in a manner which I described in a treatise on diseases of the eye, published in 1881, page 213. With the same finger I hold the upper lid, and with the middle finger at once depress the lower lid and steady the eyeball. The illumination once obtained remains undisturbed. I have also been able to hold a second lens in the same hand to be used as a magnifier, to bring the foreign body distinctly to view, and to facilitate its removal. I have had made a duplex lens consisting of two plano convex lenses, set in a ring with their convex sides toward each other, and projecting from the ring is a stem about 4 ctm. long, which is run through a cork 1 ctm. in diameter and 2 ctm. long. The lenses have a joint focus of $2\frac{1}{2}$ inches (6.3 ctm.). The cork is the handle by which the lens is held between the side of the thumb and the side of the base of the index finger, at the metacarpo-phalangeal joint.

In arranging the two lenses in place, the upper lid is pushed back by the tip of the index finger, the lens for focal illumination is set at the proper angle and distance from the cornea, the eye being turned slightly away from the window, and when this is well adjusted and the eye brought to a quiescent attitude, the lens for observation is set between the thumb and the first phalanx of the index finger, and put into the position requisite for giving a full view of the foreign body. This is done by the other hand at first, but the thumb can make small movements of adjustment by rotating the cork-handle. I was surprised to find that so much command could be gained over the observing lens by this unusual and seemingly awkward style of prehension. The illuminating lens should be larger than the other, viz., 4.5 ctm. in diameter, and the latter need not be more than 3.5 ctm. in diameter. With a little practice

one soon finds it easy to use a needle under the lens, and in the case of minute foreign bodies, their removal is more quickly and certainly effected than by the unaided eye.

The observing lens being of two and a half inches focus, and the operator's eye being distant from it, say ten inches, a much greater magnifying power is obtained than could be had by any available spectacles worn on the operator's face. In many cases no such aid is needed, or spectacles would be preferred, but in certain instances the proposed arrangement is highly convenient. (I may say in parenthesis, that should spectacles be worn the best are prismatic convex, which Brücke first suggested, with focus of ten inches and abductive prisms of 12°.) In all cases it is valuable in giving one assurance that all of the foreign substance has been removed.

I venture to add to the above communication an account of two cases, which called for unusual proceedings. The first was a child who, while looking up into a chestnut tree, had a "burr," or the spiny husk of the fruit, fall upon his eye. Ten days afterward he was brought to me. I found five of the spines sticking perpendicularly into the middle of the cornea. They had been stiff, but were now softened, and around each a little ulceration had occurred. Some had been broken off, while one had passed into the anterior chamber and left a just discernible end upon the outer surface of the cornea. I gave chloroform, and under a good light I was fortunate enough to lift all of the spines out by a pair of forceps which tapered to extremely fine flat points, and had no teeth—they were roughened at the inner surfaces by fine transverse scratches. Such forceps alone were adapted to seize the soft and friable spines which a ruder instrument would have broken off, and which a needle would have pushed into the anterior chamber.

I have elsewhere called attention to the utility of fine straight forceps with projecting teeth, which reach forward, for grasping small bits of metal imbedded so deeply in the cornea that a needle would be liable to push them through. The prehensile capacity of such teeth is far greater than when the teeth are set transversely to the axes of the blades.

The second case to be mentioned is that of a man who, while chipping iron, was struck in the eye by a flying fragment. I found a wound in the cornea about three millimetres long, in which was lodged a bit of metal which did not occupy the whole length of the cut, and whose extremity projected beyond the deep surface of the cornea. The fragment was below the external surface, and offered no

opportunity for seizure by any kind of forceps. The risk of pushing it into the anterior chamber by them was very great. A magnet was tried, but as usual in such cases, it was of no avail. I then resorted to the following plan. Inasmuch as the cut was entirely through the thickness of the cornea, and was larger than the foreign body, I put the point of a sickle-shaped needle into the cut underneath the fragment, and pressed it onward until it had passed well under it, and then with a prying movement I tilted it forward, and at the same time cut upward. The bit of iron was forced out, and some drops of aqueous escaped. The critical feature in the manœuvre was thrusting in the needle, because the wound was opened and the aqueous leaked out, while naturally there was risk of pushing in the piece. I do not regard the removal of a foreign body from the anterior chamber as a formidable undertaking, but it has more gravity than the proceeding described.

REMARKS.

DR. SEELY, of Cincinnati, referred to a similar case, the patient having fallen upon a weed from which many fine spines projected. He was unable to remove the several pieces upon the cornea with the forceps, but had to make an incision the entire length of each, and lift it out of its bed. The boy has perfect sight, and there is no opacity of the cornea.

DR. E. HUTCHINSON, of Utica, N. Y., had twice tilted a small-sized foreign body; in one case a piece of steel out of its bed in the cornea by the means employed by the president; namely, by passing a needle alongside the foreign body in the opening, and tilting it out. In neither case could the body be seen by ordinary focal illumination. In one the ophthalmoscope was necessary to the extraction of the body.

DR. C. J. KIPP, of Newark, N. J., asked whether the piece of steel could not have been extracted in this case by the magnet. He had had a number of cases in which the most powerful electric magnet failed to extract a piece of steel from the eye.

THE PRESIDENT remarked that the magnet was tried in this case.

DR. S. F. MCFARLAND, of Oxford, N. Y., had a case last fall, in which the foreign body penetrated the cornea more centrally, and entirely through its thickness; so that on extracting it a little of the aqueous humor was lost. It was tilted out in the same manner as in the president's case. Several years ago he also had a case, in which a chestnut-burr having fallen upon the eye of a young man, several of the small points remained, and were extracted by the cataract needle.

DR. S. THEOBALD, of Baltimore, saw a patient who, last January, struck his eye on a piece of corn-stalk. At the time he saw him,

which was three or four months later, there was superficial ulceration just at the periphery of the cornea, and on careful examination he discovered and extracted a piece of the stalk about three millimetres in length. It was withdrawn without trouble, and the inflammation subsided within two weeks.

DR. F. BULLER, of Montreal, Canada, thought that in the extraction of foreign bodies from the eye, each case had to be managed according to its own indications. The following case might illustrate his meaning: A lady was passing through the woods, and struck her eye against a thorn. The eye was wounded, but her physician could see no foreign body. About five days later Dr. Buller saw her, and found that the foreign body had penetrated just opposite the lower margin of the pupil, the point of it entering the iris. He thought at first that by making an incision from below, nearly through the corneal tissue, a sharp hook might be passed in and made to drag it out. This did not succeed. He then concluded to make an incision near the margin of the cornea, sufficiently wide to enable him to get hold of the body. This was done; the aqueous humor flowed off; he entered the eye with a pair of forceps, grasped the foreign body, and shoved it back without difficulty through the aperture through which it had entered the eye. The case did well.

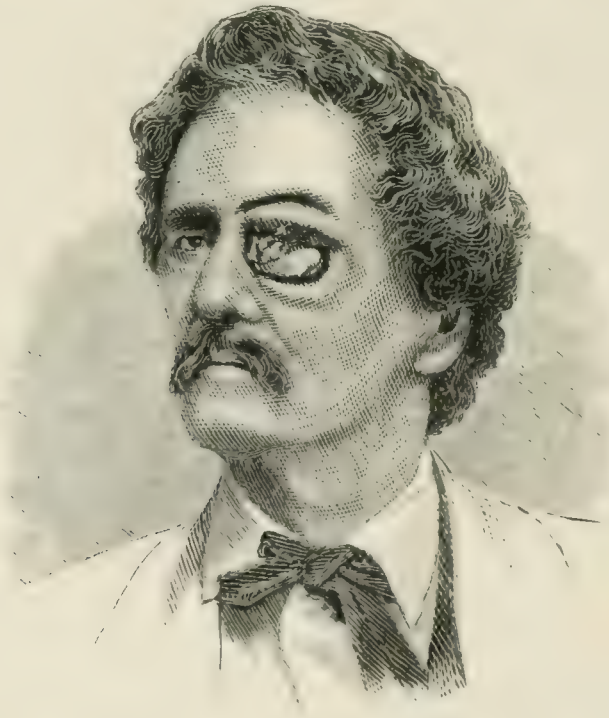
THREE CASES OF TUMOR OF THE EYE.

BY HENRY D. NOYES, M.D.,

NEW YORK.

CASE I.—John M. De G., aged fifty-one, born in the United States, painter, consulted me in May, 1881. A year previous, while he was kalsomining a ceiling, a drop of the liquid fell into his left eye. He was not obliged to stop work, but the caustic solution made his eye sore for two weeks, all the irritation being confined to its inner canthus. At this period he noticed a little swelling, which would at times become larger, and then again grow small, but never pass away. Nine months later he was struck in this eye by a lamp when he was parading in a torch-light procession, and thereafter the tumor grew larger rapidly. His condition when I first saw him was as follows: A smooth red mass occupies the palpebral opening, keeping the lids apart and completely concealing the eye; it is 5 ctm. long and 3½ ctm. wide. On pressing aside the lids, it was found to be attached to the conjunctiva of the inner side of the globe, to the caruncle, to the inner half of the lower

lid, and to the periosteum of the inner wall and floor of the orbit. It displaced the globe downward and outward, and overlapped the cornea as far as to the outer canthus. On lifting its outer edge the cornea was found clear, and the patient said that he had good sight. The tumor had never bled; it was smooth, rather firm, and yielded but little secretion. There had not been any pain. The eye was capable of motion, and the tumor participated slightly in its movements. The figure is taken from a photograph. There were no lymphatic glands enlarged; there was very little pain caused by the



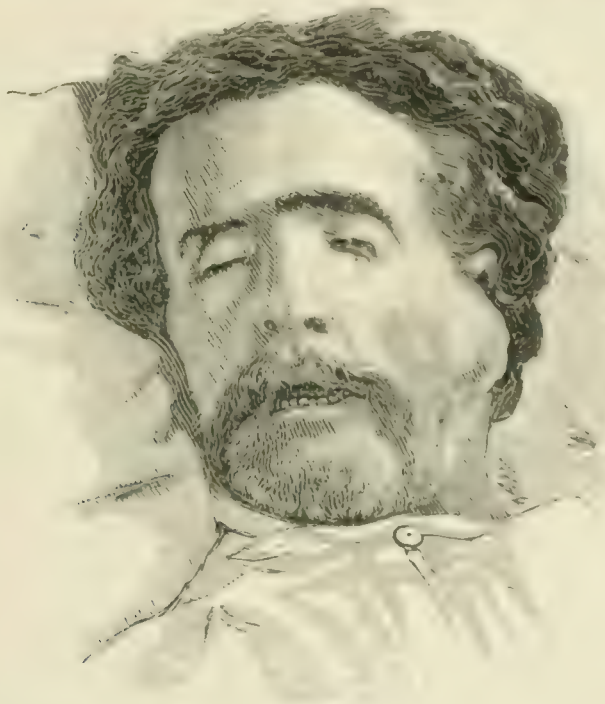
tumor. The patient's health was good, but he was extremely anxious to be relieved, and of very nervous temperament.

I determined to remove the tumor without sacrificing the eye. The patient was etherized, and the excision of the mass accomplished by a pair of strong scissors curved on the flat, whose cutting edges were used sparingly, while most of the work was done by tearing with closed blades. A deep hole was made at the inner side of the orbit, and the inner half of both the upper and lower lids was taken away. It was not necessary to remove any skin from the side of the nose. The wound was of formidable depth and extent, but was completely covered by a flap brought down from the middle of the forehead. It was found that the flap was larger than was necessary, because the removal of the tumor permitted the outer

part of the lower lid to return nearly to its proper place. As much as was thought suitable was rejected, and the parts carefully united by pins and sutures.

Healing took place without complication or accident, and the patient was dismissed on the fifteenth day. The cornea was not injured, and sight was good.

During the summer the parts remained well, and there was no sign of recurrence of the disease. In September, three and one-half months after the operation, a swelling appeared in front of the left



ear supposed to be the enlarged pre-auricular lymphatic gland. This increased in size until it became as large as a walnut. The patient was urged to submit to its removal. He delayed compliance until he was brought in a carriage to the Eye and Ear Infirmary, on October 27th, in a state of great prostration. He was in a profoundly cachectic condition. His skin was sallow, he was much emaciated, he easily vomited, his appetite poor, he was unable to sit up; pulse about 100, and weak. The pre-auricular tumor had nearly doubled in size, and another had appeared under the ear; they soon coalesced. The patient was anxious to have them removed, but his condition forbade it. He grew daily more feeble, and when the photograph, reproduced here, was taken, he was hardly able to bear the fatigue of being propped up in bed. The

picture shows the situation of the secondary tumors and the appearance of the flap. There was no evidence of return of the disease in its original situation, nor was the eye impaired, but at the upper end of the cicatrix in the forehead there was an ulceration of the skin. He died from exhaustion on November 18, 1881.

Autopsy, twenty-two hours after death, made by Drs. Oppenheimer and Orr. Rigor mortis present; body emaciated; face pinched; over the left parotid and in front of the ear a tumor the size of a small hen's egg. Scars of the operation described above. At the upper end of the scar, on the median line of the forehead, is a flattened nodule, the size of a nickel five-cent piece (about twenty millimetres in diameter). There is a similar one over the parietal bone of the left side, and one at the vertex. All these, except that on the parietal, are found to penetrate the bone, and this is found to be necrosed. The first one mentioned, viz., that on the forehead, perforates the whole thickness of the bone, and on the inner surface of the skull a small nodule was found adherent to the dura. The nodule over the parietal bone adhered to the periosteum. Over the centre of the sternum was a deep perforating point of necrosis. The right lung was firmly adherent to the chest over its whole extent by old pleuritic adhesions. Both lungs were œdematous; several firm nodules existed in their lower lobes. The heart fatty, ventricles thin; a well-organized clot was in the right auricle. The liver was normal, except some spots of fatty degeneration. Kidneys normal; there were three well-marked nodules in the pancreas. The eleventh rib of the left side was extensively necrosed and surrounded by a large mass of cancerous deposit. In the skull the dura mater was firmly adherent in the line of the longitudinal fissure. The arachnoid and pia greatly congested over the convexity. The brain tissue rather anæmic. There was a small black nodule at about the middle of the first convolution of the left side. The sphenoid bone at the sella turcica was necrosed and a dark nodule, the size of a chestnut, occupied the diseased spot. The optic commissure overlying this was discolored and seemed to be implicated. The right optic track was softened. The tumor below and in front of the ear consisted of the parotid and the pre- and sub-auricular lymphatic glands, fused together by supposed cancerous deposit. It dipped down beneath the posterior margin of the masseter muscle to the periosteum of the inferior maxilla and to the pterygoid process. It was adherent to the sheath of the carotid vessels; the temporal artery passed through its upper portion. The flap at the inner part

of the eye appeared healthy and no breaking down of its tissue could be discovered.

Microscopic examination made by Dr. James L. Minor. The specimens had been preserved in Müller's fluid and thence transferred to alcohol. The microscopic appearance presented by all of the specimens is so similar that a description of one will answer for all; and it will be necessary to point out only a few peculiarities belonging to several of them. The primary growth is of a mixed structure. By far the larger part of the tumor is composed of fusiform nucleated cells, running parallel with each other, either with or without a scanty supply of an irregularly arranged connective tissue framework, while in other localities there is a perfect alveolar arrangement of the connective tissue, the meshes of which are filled with nucleated cells of various shapes and of different sizes—most of them round, others oval, and some spindle-shaped. The whole mass contains many blood-vessels; and there are numerous hemorrhages in its substance. Dark brown pigment granules are observed, which are usually arranged in clusters in the neighborhood of a blood-vessel. The secondary growths in the cheek, scalp, dura mater, optic nerve, cortex of brain, lung, and pancreas present appearances similar to those just enumerated, with this difference, that there is a greater preponderance of the cellular elements over the alveolar framework, and a larger supply of pigment granules. The spots of softening and disappearance of bone in the skull, sternum, and rib are composed of round and spindle cells, with hemorrhages and pigment granules, without an alveolar framework. In attempting to classify this neoplasm, its dual character is at once recognized, and the term sarcoma-carcinomatoides describes the appearances so well that it may be advantageously applied, though the growth probably belongs to the sarcomata, being a spindle cell melanotic sarcoma. The alveolar connective tissue framework, which would place it with the carcinomata, evidently occupied a subordinate position, and must give place to the cells, which places it with the sarcomas.

In a paper contained in the *Archives of Ophthalmology*, edited by Drs. Knapp and Hirschberg, for July, 1879, Vol. VIII., No. 2, p. 145, I reported a case of melanotic epithelioma of the surface of the eye, which was removed, and up to this time has not recurred. I gathered the statistics of extraocular neoplasms with a view of determining in what proportion they might prove to be of purely local char-

acter, and how frequently they would be found to be part of a constitutional malady. This involved also the question, how often after the removal of such a tumor the eyeball might be preserved. I collected 127 cases. In all an operation was performed. In 36 the ultimate issue was not stated. Out of 91 cases there were 20 in which a period of exemption varying from six months to seven years was observed. It was also found that some tumors which did recur, and were again extirpated, in some instances more than once, finally ceased to reappear, and the eye was permanently saved. In other recurring tumors which ultimately entailed the loss of the eye, the organ was saved for periods varying between one and eleven years.

The conclusion warranted by these researches is that an effort to save the eye is always justifiable, when its integrity has not been compromised. I think the case which has just been narrated strengthens this inference, notwithstanding the ultimate taint of the constitution. There was no return of the disease in the place where it at first broke out, and during the period of his survival the patient enjoyed the use of his eye. While the first visible recurrence of the disease was in the neighboring lymphatic glands, it cannot be affirmed that this was the first spot to be attacked by a relapse, because the pancreas was extensively invaded, and likewise remote parts of the body tissues. The disease was completely removed from the place where it at first took root, and the subsequent return was to be ascribed to the constitutional dyscrasia.

CASE II.—*Epithelial Cancer of Ocular Conjunctiva—Removal—No Recurrence after Two Years.*—Mr. H. A,. aged seventy-one, merchant, Greenwich, Ct., on June 8, 1880, consulted me respecting his left eye. Three months before the eye felt as if it had been pricked. Three weeks later a film came over it, and a week after this a fleshy growth was noticed on the temporal side of the limbus. After this the eye became red, and remained inflamed for some weeks. Has had no pain, but a feeling of soreness. The growth is in the ocular conjunctiva, on the temporal edge of the cornea, and is of the following dimensions: transverse, 7.5 mm.; vertical, 5 mm. It is white, with a pinkish tinge, smooth, as if covered with epithelium, and many large vessels in the sclera converge to it. The cornea is clear and vision good.

June 9th, the growth was thoroughly removed by scissors, and the edges of the conjunctiva brought together with sutures. That part encroaching on the cornea was also removed. The microscopic

examination showed the growth to be epitheliomatous. Epithelial nests, epithelial pearls, and irregularly distributed cells, with scanty connective tissue were noticeable. The wound healed kindly, and the patient was dismissed on June 12th, cured. He was seen at intervals of about six months, and the last time in December, 1882, when the parts were perfectly healthy, and the eye normal.

CASE III.—The following case of choroidal tumor, although pathol logically not rare, possesses in its symptoms and history clinica- features which make it interesting:

Mr. William P., born in Scotland, and living in Ohio, aged fifty-six, came to me at the New York Eye and Ear Infirmary on May 12, 1882. He was robust, and in good health. He stated that about a year previous his left eye became dim, without apparent cause, and he determined to go to Scotland for advice. He placed himself under the care of a surgeon of Glasgow, who told him he had subretinal effusion. He was treated for this lesion, and also treated for suspected or declared sympathetic trouble in the opposite eye. The sight in the first eye grew worse, and finally almost disappeared. No inflammation took place, and in the early part of April he came to New York. Then acute pain and inflammation attacked the left eye, and after it had continued for some time he came to the Eye and Ear Infirmary.

The situation of the left eye was as follows: The cornea clear; aqueous hazy; iris discolored; no pupillary adhesion; pupil in medium dilation; no reflex to be gotten from the fundus; tension +1 or almost +2. A dull perception of light over the extreme lower part of the field; in other parts no perception at all. On this history and these symptoms I founded the diagnosis of almost total subretinal effusion, accompanied by intraocular tumor. The history of the case, and the character of the visual field, furnished the diagnosis of the subretinal effusion. The recent attack of inflammation, to which the obscurity of the fundus was to be ascribed, and the increased tension, led to the belief in the coexistence of an intraocular tumor. As is well known, eyes with subretinal effusion usually have diminished tension when the disease is idiopathic. Furthermore, an acute attack of inflammation, with serous effusion supervening upon retinal separation, calls for an unusual cause to explain it. I call to mind three cases in which I have seen the concurrence of the above group of symptoms depending upon the assumed conditions.

The other eye exhibited no abnormal signs, but its sight was very bad; the record does not state its acuity. The field was perfect. By the ophthalmoscope the media were found clear and the nerve extremely congested. At first sight the idea of neuritis was suggested, but careful inspection with the proper glasses disclosed that there was a high degree of compound hyperopic astigmatism. Instantly, a clue seemed to be offered to some of the peculiarities of the case. The man found, when his left eye was impaired, that he could see very badly with the one remaining. In Glasgow, he was treated for sympathetic trouble of the fellow-eye—and he had in this eye, as stated to me in a letter from the Scotch surgeon, "spectra and other subjective symptoms of an anomalous character, followed by well-marked engorgement of the disk. Under treatment, the eye slowly recovered, leaving the optic nerve somewhat congested. During the whole time he was under observation there was no external inflammation, and no increase of tension in either eye. From the appearance of the right optic nerve, and the peculiar mental state of the patient, I supposed that there was some intracranial mischief, probably tumor of the brain."

This letter was received after the patient had gone from my observation. It is true that the patient was much excited and distressed at the situation in which I found him, but there were no brain symptoms. Vision of the right eye was brought to $\frac{20}{XXX}$ by $+24_{s}\bigcirc+9_{c}\ 90^{\circ}$; and when this combination was placed behind the ophthalmoscope (to my instrument the cylindric glasses of the spectacle-box can be fitted by a spring clip) the hazy look of the disc vanished; there was no swelling of the nerve; it was congested, and had the dim look which is its characteristic in many eyes with congenital refractive errors of a high degree.

I felt confident that this eye was not suffering from sympathetic trouble; I at once proposed enucleation of the other eye, because of what I believed to be the cause of its inflammation. The next day the operation was performed. The eye was opened by a section on the vertical meridian. The diagnosis was verified in both its parts. A tumor about 9 mm. in diameter was found springing from the ciliary region in the upper part of the vertical meridian, and there was total detachment of the retina.

Subsequent examination showed the tumor to be a sarcoma.

A few days after the operation the patient was provided with the above-mentioned spherico-cylindric glass for constant wear, and with $+8_{s}\bigcirc+9_{c}\ 90^{\circ}$ for reading.

All his unpleasant symptoms disappeared, and he went to Ohio.

That a high degree of refractive error, *e.g.*, hyperopic astigmatism, can be misinterpreted for optic neuritis, and be regarded as the evidence also of a sympathetic affection, I have had occasion to know. The mistake was rendered easy because one eye had sustained a destructive injury, and the surgeon, who was a most competent oculist, was anticipating such an issue.

Acute secondary glaucomatous inflammation supervening upon sub-retinal effusion is certainly to be regarded as indicating either an intraocular tumor, or an intraocular hemorrhage—in the majority of cases.

REMARKS.

DR. BULLER, of Montreal, referred to a case in which he enucleated the eye for a malignant tumor, and afterward applied chloride of zinc paste within the orbit, in case some of the remaining tissues might be affected. The patient afterward had symptoms of meningitis, but entirely recovered. An interesting fact was that there should be meningitis without any necrosis of the bones intervening between the eyeball and meninges.

DR. PROUT, of Brooklyn, N.Y., referred to a case in which he used chloride of zinc after removing the entire contents of the orbit. There was almost no suppuration, and the cavity was very slow in filling up. He had had another very similar case. He had had no other trouble from its use, and thought, from his experience in these and other cases, that it tends to lessen suppuration very decidedly. It may be equally well applied to wounds of the soft tissues, and seems to hasten union and prevent inflammatory reaction by its local antiseptic action. He first saw this use of the chloride of zinc advocated by Mr. Campbell De Morgan in *The British and Foreign Medico-Chirurgical Review*, January, 1866, page 201; it is also quoted in *The American Journal of the Medical Sciences*, April, 1866, page 532.

CONTRIBUTION TO THE CLINICAL HISTORY OF METASTATIC IRIDO-CHOROIDITIS.

BY H. KNAPP, M.D.,
NEW YORK.

MR. PRESIDENT AND GENTLEMEN: The interest of the short communication which I beg to read before the society lies chiefly in the observation of the case of a young lady who, by exposure during menstruation, contracted in the lower part of the abdomen an inflammation, which was followed by transient internal ophthalmia in one eye, and purulent irido-choroiditis, with destruction of the globe, in the other. The clinical history is as follows:

Miss Amelia Q., eighteen years old, of New York City, consulted me April 20, 1881. She was employed as a milliner in one of the high Broadway stores, in which, three weeks previous to her coming to me, the staircase door had been taken out on account of alterations being made in the building. Her business required frequent going up and down stairs, and, the weather being very cold and windy, she was for a week greatly exposed to the draught. At the same time her menstruation had set in, which, with her, commonly lasts a week, and is very profuse. On the seventh day she experienced spasms and great pain in the lower part of the abdomen. The next day she had chills, and became so ill that she was obliged to lie in bed for ten days. Her hypogastrium was swollen and very tender. On the advice of her physician she poulticed it, and felt relieved.

On the second day of the attack her left eyeball became bloodshot, but was free from pain, and she was not aware of any impairment of sight. The next day the eye improved, and on the third day it was well again. On the second day, however, inflammation appeared in the *right* eye, beginning with pain, and redness and swelling of the conjunctiva and lids. The vision was lost in a few days; the lids were greatly swollen, and the globe protruded markedly for about a week, then the inflammation and pain abated. When she presented herself to me I found œdema of the lids and conjunctiva, a ring-shaped opacity in the cornea, the pupil totally, and the anterior chamber partially, occupied by pus, the dark iris

visible only at the periphery, the eyeball tension increased, and sight reduced to faint perception of light.

On April 24th, four days later, I found the inflammation less, the cornea, anterior chamber, and pupil clearer, the tension of the globe diminished, but still perception of light.

On April 30th the pupil was free, and a yellow reflex emanated from the vitreous.

On May 7th the eyeball was smaller, the yellow reflex from the vitreous still present.

On May 31st, almost two months after the inception of the ocular affection, the right eyeball was shrunken, the iris atrophied, the cornea smaller, diffusely hazy and wrinkled, the eye free from pain, totally blind. The other eye normal in sight, in external and ophthalmoscopic appearances. The patient has worn an artificial eye since, and experienced no discomfort in either eye.

That the period of menstruation, though a condition of health, is characterized by general weakness and a greater susceptibility of contracting disease, is well known. The physiological congestion of the uterus and its surroundings may, by exposure, be easily increased to a real inflammation, which, in the case just related, assumed a pyæmic nature, resembling puerperal metritis, and was followed by metastatic irido-choroiditis. This succession of grave pathological conditions is unique in my experience, but it struck me as being quite important. That there may be mild cases of pyæmic irido-choroiditis, which do not lead to destruction of the eye, under the picture of panophthalmitis, is, I think, not sufficiently acknowledged. The affection of the left eye of our patient I am inclined to look upon as having been a mild and transient attack of pyæmic choroiditis. If my memory serves me, anatomical evidence for this opinion is not wanting, and chiefly furnished by the examination of the two eyes of women who died from puerperal fever, the eyes having shown similar initial symptoms, which in the one had more or less disappeared, in the other more developed. It seems to depend upon the extent of the infarction whether the initial morbid changes become regressive as long as they admit of restitution, or whether they are progressive and lead to the destruction of the affected organ. Metastatic choroiditis is considered one of the most destructive eye diseases, and, when fully declared, the eye is certainly doomed; but, under the same etiological conditions, affections of the same kind may occur that widely differ as to

their extent and intensity, and this point should be borne in mind when pyæmic inflammation has destroyed one eye, and the other shows symptoms of the same affection. The great majority of cases of metastatic choroiditis which have come to my notice were consequent upon cerebro-spinal meningitis. The eyes which I have seen affected during or after that disease were, I must confess, almost all totally destroyed, yet the experience of a specialist must, in this respect, differ from that of a general practitioner. The specialist sees only the bad or lost cases, whereas the general practitioner sees them all, mild and grave.

From the descriptions of Niemeyer and others, who have witnessed epidemics of cerebro-spinal meningitis, it is evident that a certain number of cases of irido-choroiditis occurring in the course of that disease, recover with retention of good sight. The blindness from cerebro-spinal meningitis is, however, not invariably, though mostly, the result of purulent irido-choroiditis, but may, as Schirmer has shown, be the result of optic nerve atrophy. I can confirm this statement, and beg to mention a case in which sight was lost in one eye from the former, in the other from the latter affection.

Marx K.'s daughter, aged five years, was brought to me December 12, 1881. She had had cerebro-spinal meningitis in June previous; lost sight in *left* eye during the disease. Two months later had a relapse of the general disease, on the second day of which, she lost the sight in the *right* eye. Has been blind since, but hears well. I found the right eyeball normal in external appearance, pupils not responsive; optic disc white, vessels somewhat smaller. Left eye phthisical, presenting the characteristic picture of purulent choroiditis from cerebro-spinal meningitis. She was seen later, but sight had not returned.

Prognostically, Gentlemen, I would not consider every case of metastatic irido-choroiditis as necessarily leading to blindness, but it may be difficult in the milder cases to establish the *diagnosis* beyond a doubt. If mild pyæmic inflammations occur in many other organs, as is well known, why should they not occur in the eye?

The *treatment* ought to be prophylactic and curative or palliative. The case which forms the basis of this paper is only one example more, after thousands of others, to caution ladies, married or un-

married, not to expose themselves during the period of their menstruation. The same warning should be given to such patients as suffer from diseases which are likely to produce pyæmic inflammations—for instance, suppuration of bones, or of cavities, including the middle ear, the puerperal state, etc. As to the curative treatment I would recommend quinine and the application of cold, which may possibly save an eye, as long as panophthalmitis is not yet declared. I would avoid leeching and depletion in general, as an hydropic condition of the blood seems to favor embolism, thrombosis, transudation, and extravasation.

As soon as panophthalmitis is manifest, palliative measures alone are indicated.

REMARKS.

Dr. E. Hutchinson, of Utica, N. Y., said that he had seen a case recently, the history of which was that of acute articular rheumatism. During the attack the patient had an iritis, and finally suppurative irido-choroiditis. The young man was brought to him as soon as he was able to travel, and the doctor found the globe soft, the iris adherent, the pupil occluded, and no perception of light. He performed enucleation at once, and found the choroid and retina covered with pus. Another case occurred in a young man who had lumbar abscess, and who finally died of pyæmia. Both eyes were absolutely blind. From the yellowish green reflex, and from other symptoms present, he had beyond question suppurative irido-choroiditis.

The President remarked, with regard to the effects of cerebro-spinal meningitis upon the eye, that he knew a young man who, from cerebro-spinal meningitis, had total loss of hearing in both ears, and atrophy of one optic nerve, the other eye remaining normal. The explanation of optic nerve atrophy in such cases, he thought, might be the same as that of choroidal disease; it might be an extension of the disease down the sheath of the optic nerve. At any rate, whether or not the two conditions were analogous, atrophy of the optic nerve was one of the sequences of cerebro-spinal meningitis.

Dr. McKay, of Wilmington, Del., remarked that he reported a case, in which he found most of the conditions described by Dr. Knapp present in the eye of a colored child, which had died of cerebro-spinal meningitis, and the condition of the eye was supposed to be the result of that affection.

A SIMPLE TEST FOR SIMULATED MONOCULAR BLINDNESS.

By G. C. HARLAN, M.D.,
PHILADELPHIA, PA.

THOUGH a great many tests for simulated monocular blindness have been devised, I do not remember to have seen the one used in the case recorded below suggested by any one else. As such cases are sometimes difficult of detection, and occur more frequently than is generally supposed, it is convenient to have a variety of tests at our command, and I perhaps need no excuse for adding a very simple one to the list.

I was recently asked by Dr. Charles K. Mills, a well-known neurologist of Philadelphia, to make an ophthalmoscopic examination in the case of a patient whom he had been called to see in consultation. She was a lady of middle age, previously in good health, of strong will, and active, energetic, and sensible. She had been sick only a few weeks; and, about a week before I saw her, had violent epileptiform convulsions, accompanied with complete insensibility for some hours, and followed by hemianæsthesia of the left side, violent pain in the forehead and occiput, unilateral sweating, partial loss of power in the left limbs, and complete blindness of the left eye. She had complained, some days before, of dimness of vision in this eye. I found her in bed, the object of great anxiety and frequent consultations, and unable to be raised from the pillow for ophthalmoscopic examination. There had been some improvement in vision, and large objects could be indistinctly seen. On testing her for color, with small squares of paper on black ground, she could recognize only the blue, and that with difficulty; but excited my suspicion by stating that there seemed to be two blue spots. Expressing myself satisfied with the examination of that eye, I impressed upon her the importance of deciding if the other were perfect, and my anxiety to determine the smallest letters that she could see through a glass. I then held the three-inch object-glass of the ophthalmoscope before the right eye, and she read No. 3 S., at about 2½ feet, with ease, of course with the left eye. Whether or

not she could have done this consciously, is a point for psychologists to decide. I am inclined to believe that she could not. In either event, she belonged to quite a large class of patients who make excellent subjects for miraculous cures at the shrine of metallo-therapeutics.

Nearly ten years ago, I made use of a similar test, in a case that was reported at the time in the *American Journal of the Medical Sciences*. A girl, eleven years of age, apparently in excellent health, was brought to me by her parents, with the statement, that they had recently discovered her left eye to be quite blind. She had been sent to the family physician, a homœopath, on account of a slight conjunctivitis, and, as the result of the consultation, had returned with this startling announcement. She denied even perception of light in that eye. I failed to detect, or even suspect, the deception; but as a careful ophthalmoscopic examination revealed no imperfection of the organ, I assured the girl's parents that there was no present disease there, and no indication for treatment. The other eye had full vision. Two years afterward she was again brought to my office, complaining that the other eye was failing, the left still continuing stone-blind. She said that the print looked blurred when she attempted to read, and her parents had noticed that she held the book nearer to the eye than usual.

She admitted a vision of $\frac{20}{L}$, and with a 2 D. glass acknowledged to $\frac{20}{XI}$; and when required to read the test letters at varying distances, there were evident discrepancies in her answers. I placed the trial frames before her eyes, with a plain glass in the left side, and a convex one, of ten inches focal distance, in the right. The latter, without exciting her suspicion, excluded the right eye from any distinct vision beyond the focus of the glass; but she still read No. L. at 20 feet as before. Then, having first substituted for the test card another with a different series of letters, I placed an opaque disk in front of the blind eye, and she could not make out a letter. This proved, at least, that she had been reading No. L. at 20 feet with the eye that she pretended was not conscious of the bright glare from the ophthalmoscopic mirror. She did not appear again; but her father called upon me some days afterward, and reported that she had come home in a very bad humor, indignantly accusing me of having treated her with great injustice; but, the next day, had made admissions, which, though partial and constrained, were sufficient to convince him fully of the correctness of my view of the case.

SARCOMA OF THE LACHRYMAL GLAND.

By G. C. HARLAN, M.D.,
PHILADELPHIA, PA.

THE patient was a shoemaker, aged seventy, in excellent general health. He stated that four years before he had noticed a swelling of the upper lid of the right eye. This increased slowly, forcing the eye downward and forward and gradually closing it until, within the last two or three months, he had been unable to expose the ball at all. There had never been the slightest pain or tenderness.

There was a tumor, the size of a hen's egg, occupying the position

of the upper lid and immediately beneath the skin, which could be moved freely over it. The tumor itself was also movable; it had a firm cartilaginous feel and was distinctly lobulated. The eyeball was forced completely out of the orbit, being dislocated forward, downward and outward, and fixed immovably. The top of the equator was below the level of the pupil of the other eye. The accompanying sketches, made by Dr. J. M. Taylor, will give an idea

of the size and form of the tumor, and the position of the ball. The skin of the lids, though very much stretched, was quite loose and entirely covered the ball. There was quantitative vision. A haziness of the media made the fundus indistinct, but it could be seen that

the veins were congested and contorted, and the disc was swollen. There were no glandular enlargements.

A free incision was made over the tumor and a narrow elliptical piece of the skin removed, and the mass, which was without adhesions, was easily turned out with the fingers. The seat of the lachrymal gland was left entirely vacant. A microscopical examination, made by Mr. Geo. Junkin, Jr., of the University Laboratory, showed the growth to be a small spindle-celled sarcoma.

When the eyeball was relieved from pressure it was noticed to be so soft that a suspicion was suggested that the sclerotic had been wounded in the operation. At present, two weeks after the operation, the wound is entirely closed, the intraocular tension is normal, and the eyeball has resumed nearly its natural position, and moves freely in all directions except upward, while even the superior rectus is regaining its power.

Neoplasms of the lachrymal gland are considered rare. The points of special interest in this one are the entire absence of pain throughout the course of the disease, and the outward direction of

the dislocated ball. An inward direction would naturally be expected, and is sometimes included among the diagnostic symptoms. The tumor failed to find room in the position of the lachrymal gland to expand to the large size that it reached, and, therefore, developed toward the inner side of the orbit.

REMARKS.

DR. S. THEOBALD, of Baltimore, mentioned the case of a large tumor, apparently originating in the lachrymal gland, which he saw. The ball was pushed downward, inward, and forward, resting almost upon the nose. It was removed five years ago, and it was believed to be of a sarcomatous nature.

DR. C. J. KIPP, of Newark, N. J., said he had seen a number of tumors which corresponded in gross appearance to those mentioned, but on microscopical examination they were found to be of an adenoid structure, described by Berlin as cylindroma. He believed sarcoma very rarely existed in this locality.

DR. KNAPP remarked that lately he had removed a similar tumor of the lachrymal gland 50 mm. by 40 mm. in size. It was well defined, easily removed, the healing by primary union (no antiseptics), globe returned to its natural position, normally movable, the upper lid movable too. There was optic neuritis (S. $\frac{20}{LXX}$) before the operation, now slowly disappearing. The aspect of the cut surface of the tumor was different from what Dr. Knapp had seen in these tumors; it was homogeneous, purplish-red, consistency of flesh; no amyloid reaction. An immediate cursory examination with the microscope showed a scant amount of connective-tissue fibres, with many small, round, and spindle-shaped cells. No indication of a glandular structure.

DR. KIPP remarked that after removal of the tumors in the cases to which he referred, tears continued to be secreted, and the flow could be increased by stimulation.

DR. HARLAN remarked that a few years ago he assisted to remove a tumor from the orbit, not originating, however, in the lachrymal gland, and it was pronounced to be a spindle-celled sarcoma. It had been growing nearly thirty years.

DR. KNAPP here remarked that the protrusion of the ball outward, instead of inward, in the author's case, was certainly unique, so far as he was informed. He added that, as in the author's case, when he cut the covering of the tumor it presented the appearance of the cut testicle.

A CASE IN WHICH AN ATTACK OF ACUTE INFLAMMATORY GLAUCOMA WAS IMMEDIATELY FOLLOWED BY INFLAMMATION OF THE BRAIN.

By CHARLES J. KIPP, M.D.,
NEWARK, N. J.

MRS. H., fifty-one years of age, a stout, healthy German woman, came to the Newark Charitable Eye and Ear Infirmary on December 3, 1881, with a letter from Dr. T. Y. Sutphen, of Newark, stating that he had first seen the patient on the day before, and that he found her suffering from acute glaucoma, for which he had prescribed instillations of the sulphate of eserine. From the patient it was learned that the attack began ten days before with great pain in her back, which was followed a few days later by severe headache and sickness of stomach. On the advice of her family physician she applied a fly-blister behind the right ear, and another above the right eye, on November 28th, and within less than half an hour after their application the right eye became red and excessively painful. Since then the sickness of stomach and the pain in the head and eye have continued. Within the last few days the right eye has become blind.

The symptoms presented by the eye when I first saw the patient, were those of acute inflammatory glaucoma; there was, however, greater congestion and chemosis of the entire ocular conjunctiva than I had ever before seen in this disease. The pupil was of medium size—a one per cent. solution of the sulphate of eserine having been frequently instilled during the preceding twenty-four hours. The media were so cloudy that the fundus oculi could not be seen. The eye had perception of light only. Tension $+2$. The pain in eye and head was almost unbearable.

I immediately put the patient under the influence of ether, and made a tolerably large iridectomy upward with a narrow v. Graefe knife. The operation was perfectly clean, but all efforts to return the corners of the sphincter to their proper position were fruitless, although no iris was apparently remaining between the lips of the wound. During the night following the patient slept soundly, and next morning was entirely free from pain in eye and head, and the tension of the eye was normal. On the third day after the opera

tion she was able to see me distinctly with this eye. The anterior chamber was restored, and the congestion and œdema of the ocular conjunctiva were subsiding. But during this day the left eye became painful and inflamed, and on the morning of the fourth day presented the symptoms of a moderately severe attack of acute glaucoma, which, however, yielded to instillation of the sulphate of eserine in the course of two days, and left the sight of this eye unimpaired. The only feature of this attack worthy of mention was the excessive pale œdema of the ocular conjunctiva which, in some places, was raised in the form of blisters.

Ten days after the iridectomy, the right eye was nearly free from conjunctival injection; the anterior chamber was somewhat shallow; the iris nearly normal; the pupil of medium size, and the media were clear. Tn. The left eye was apparently healthy; the pupil small and fastened by numerous small synechiæ to the anterior capsule. At the urgent request of the patient I allowed her on this day to be taken in a carriage to her home, which was but a short distance from the hospital.

During the following ten days the eyes continued to improve, but on December 25th, twenty days after the iridectomy, the right eye became again very painful, and the sight failed rapidly. At my visit on this day, I found some œdema of the lids, and the ocular conjunctiva intensely injected and very œdematous. The cornea was clear, but the iris was discolored and swollen. The pupil and the coloboma were apparently somewhat smaller than before. The vitreous was so full of opacities that the optic disc could not be seen.

The lids of the left eye were also puffy, and the ocular conjunctiva œdematous, but not so much injected as in the right eye. The cornea was dull. The anterior chamber of about normal depth, and the iris somewhat discolored. The pupil was small and excluded. The vitreous was very hazy. This eye was also very painful. Vision was not, so far as I could make out in her own room, greatly impaired. In both eyes the tension was little, if any, above the normal. The patient complained chiefly of the severe pain at the top of her head, and of persistent distressing nausea. Pulse 96. Temperature normal.

In the absence of a marked increase of tension in either eye, I concluded to delay further surgical interference, and ordered applications of ice to the lids of both eyes, and instillations of the sulphate of eserine in the right eye. Morphine was administered for the relief of the pain.

On the following day the pain in the head and the eyes and the nausea continued unabated. The swelling and congestion of the ocular conjunctiva of the left eye had increased. The iris was more swollen and the tension slightly increased. The right eye was unchanged. I now requested that the patient be transferred to the infirmary for the purpose of making an iridectomy on the left eye. Meanwhile instillations of eserine were made in both eyes and the sulphate of quinine was given in considerable doses.

In the afternoon of the next day the patient was brought to the Infirmary. An examination made at this time showed the left eye to be in about the same condition as on the previous day. In the right eye the cicatrix of the iridectomy had become softened, and at both ends a small prolapse of iris was seen under the conjunctiva. Otherwise this eye remained as before. The patient was put under the influence of ether, the prolapsed iris in the right eye was abscised, and a small but clean iridectomy made on the left eye. The abscission of the prolapsed iris caused the evacuation of the anterior chamber. Notwithstanding these procedures, the pain in the eye and the head and the nausea continued.

On the second day after these operations, the swelling and injection of the ocular conjunctiva of the right eye was as great as before; the anterior chamber was not restored; the iris was swollen and the pupil small. In the left eye the ocular conjunctiva was more swollen and injected than before the operation; the anterior chamber was restored; the iris was discolored, and the pupil contracted. The pain in the head and the eyes continued. Atropine was instilled in the left eye.

On the following day the right eye was unchanged. In the left eye the aqueous humor was turbid; otherwise there was no change. Patient was very restless, and complained bitterly of the pain in the head and the eyes.

Next day a fibrinous exudation covered the iris, and a star-shaped mass obstructed the pupil in both eyes. Notwithstanding frequent instillations of a two per cent. solution of atropia in the left eye, the pupil remained very small. Six leeches were applied to each temple, and warm water fomentations were kept steadily on the eyes. The instillations of atropia were continued. Quinine was administered as before, and morphine was given in sufficient quantity to control the pain.

The eyes remained in this condition during the next three days, and then began to mend slowly. The swelling of the ocular con-

junctiva subsided gradually ; the aqueous became clear ; the exudation disappeared from the iris, and the plug in the pupil was changed into a thin membrane. The pupil remained contracted. On the seventh day after the iridectomy on the left eye, the patient raised a considerable quantity of a dark red fluid. During the night she perspired a great deal, and was mildly delirious. No evidence of disease of the lungs or of the heart could be discovered. There was no cough. The temperature was normal and the pulse varied between 90 and 100. The expectoration of the dark fluid continued for two days and then ceased. After this the patient was comparatively free from headache and from pain in the eyes ; but the nausea, the night-sweats, and the mild nocturnal delirium continued. During the day she slept considerably. Her bowels were constipated, and she complained a good deal of dysuria, which was, however, speedily relieved by the free use of flax-seed tea.

On January 7th, eleven days after the iridectomy on the left eye, both eyes became again very painful. The lids of the right eye became œdematous, and the ocular conjunctiva swelled to a greater extent than at any previous time. The corneal cicatrix of the iridectomy re-opened in its entire extent, and the iris was protruded between its lips. The tension of the eyes was greatly diminished. The lids of the left eye became also swollen, and the fleshy chemosis, which had greatly diminished, rapidly attained its former degree. The aqueous was muddy, and the iris much swelled. Tension of this eye was about normal.

The headache was now as severe as ever. In the daytime the patient was in a state of stupor, from which she could be aroused, however, without great difficulty. During the night she was violently delirious. All food was refused. The nausea and the constipation continued. Temperature and pulse were normal. In addition to the medicines previously mentioned, she was now given small doses of calomel. The bowels were moved by castor-oil.

On January 10th the right eye was unchanged. In the left eye the anterior chamber was greatly diminished in depth ; otherwise the eye presented no change. Both eyes were so sensitive to the touch that the patient would cry out if an attempt was made to open the lids. From this time until her departure from the hospital the eyes remained in the state last described. There was but little change in the other symptoms. The patient was in a semi-somnolent condition all day, and frequently moaned pitifully. The night-sweats ceased, but the delirium continued.

On January 14th she became comatose. Passed urine in bed. Obstinate constipation.

On January 16th she had a series of epileptiform convulsions. The coma continued, at times a dark fluid escaped from the mouth when the head was turned to either side. Pulse, 120; temperature, normal.

January 20th.—Since last report the patient has had daily a number of convulsions. The coma continued till this morning. The patient has taken some liquid nourishment and appears to be conscious at times. She has to-day, for the first time, asked for the chamber, and apparently knows her nurses. Most of the time she is asleep. Pulse, 120; skin, cool. Bowels moved to-day for first time for a week. This improvement continued until the night of January 24th, when she became so greatly excited that it required several persons to prevent her from getting out of bed.

January 25th.—Patient was delirious all day. She refused to take food, and spit out all that was put in her mouth. She vomited several times and had a passage from her bowels. In the evening she had another series of epileptiform convulsions.

January 29th.—Since last report the patient has been delirious night and day. Morphia and bromide of potassium were given, but had but little effect. The bowels were again constipated. She took but little food. At times she would ask for the chamber to urinate, and at other times pass her water in the bed. Pulse, 120–130; temperature, normal. Patient was on this day removed from the hospital to her home, where she died February 8th, at 9 A. M.—sixty-seven days after she came under my observation. As regards the symptoms during the last ten days of her life, I know nothing. No autopsy was made.

Remarks.—The case here reported is the only one in which cerebral disease supervened on glaucoma occurring in my practice, and I have been unable to find in the literature accessible to me a report of a case at all resembling the above.

It is well known that an attack of acute glaucoma is sometimes developed in the course of severe inflammatory diseases of other organs, and in fevers, and it seems to me to be not at all improbable that in this case also the cerebral disease existed at the time the glaucoma first manifested itself. The back-ache, the pain in the head, and the distressing nausea which preceded the pain in the eye may as well have been symptoms of the cerebral disease as of the glaucoma, though it must be admitted that this supposition is not

strengthened by the fact that the symptoms enumerated were relieved for some days by the iridectomy. That the brain affection was caused by the glaucoma will not be maintained, I think, by any one familiar with brain diseases. With regard to the very unusual course of the eye affection, I am inclined to think that the numerous posterior synechiæ observed in the left eye after the first attack of glaucoma were the result of the prolonged use of the sulphate of eserine. For the relapse of the glaucoma, after the iridectomy and reopening of the cicatrix, several weeks after the operation, I am unable to assign any other cause than the cerebral disease.

NOTE.—Since the above was written I have read MOOREN'S "Fünf Lustren Ophthalmologischer Wirksamkeit," just published, in which I find it stated that the author has seen four cases of glaucoma which were caused by myelitis. In MOOREN'S opinion the glaucoma resulted in these cases from the irritation to which some of the fibres of the trifacial nerves were subjected at their point of origin. MOOREN states it also as his conviction that a causative relation exists between softening of the brain and glaucoma, and mentions it as a fact that many glaucoma patients are, in later years, attacked by brain disease.

REMARKS.

THE PRESIDENT was satisfied that some such connection between the eye and the cerebral symptom as was mentioned by the author did exist in some cases. He had one case of the kind, in which an attack of acute glaucoma was the initiatory symptom of a brain trouble, which terminated in death. At the autopsy he found softening of the brain with extensive and very severe atheromatous degeneration of the arteries.

EMBOLISM OF THE CENTRAL ARTERY OF THE RETINA.

By W. F. MITTENDORF, M.D.,
NEW YORK.

THE diagnosis of an embolic process of the central retinal artery by v. Graefe, in 1858, has been justly considered as one of the greatest victories of the genius of this observer, and of the usefulness of the ophthalmoscope. There is but little to add to the graphic description of such attacks as it is given by this illustrious ophthalmologist in the *Archives of Ophthalmology*, Vol. I., p. 136, and I am only encouraged to lay before you the notes of three cases of the kind which have recently come under my observation, partly because the disease is comparatively rare, and also because each of them presents some peculiar features which may be of interest to you.

Two of these cases came to me within a few months of each other. One of them was shown to the members of the New York Ophthalmological Society at the time of the most marked œdematous infiltration of the retina, and the second one has been seen by many of my confrères at different stages of the affection. Fortunately for my patients, the diagnosis had to be based upon the ophthalmological appearances alone, and has not as yet been confirmed by *post-mortem* examination, nor is there any prospect at present that this can be done for a long time to come.

The first case is that of a bright and intelligent lady, a native of the United States, thirty-two years old, married and the mother of several children. She has suffered repeatedly from severe attacks of inflammatory rheumatism, and lost the use of the right arm several years ago (possibly by an embolic process of one of the left cerebral vessels, as there is not the slightest sign of a specific complication). She never had any disease of the eye, and has always enjoyed excellent vision of both eyes, and has used them very much for fine needlework. On October 2, 1881, she was requested by one of her friends to assist her in shopping, and after dressing rapidly and attending to some necessary house-work, which required the lifting of several heavy boxes, and some running up and

down stairs, she left the house in perfect health. After going about ten blocks she was struck by the fact that she could not see as far outward toward the left side as usual, and speaking of this to her lady friend, upon the advice of the latter closed the right eye, when she discovered that the left eye was completely blind; it appeared as though a reddish gray mist had spread over her sight. She returned home and went to bed, hoping that it would pass off, but it did not only not improve, but the shade became darker. She called on me the next day, when both eyes appeared perfectly normal, not the slightest change being visible to the naked eye, but the slightly enlarged pupil of the left eye did not respond to the light-test, nor could she perceive the slightest amount of light. The right eye was slightly hypermetropic, vision and projection was perfect. On ophthalmoscopic examination, the peculiar pallor of the retina was very marked and quite extensive, leaving only the most peripheral part of the retina in its usual color. The optic disc appeared red, and the outline very indistinct, which was due to the swelling of the surrounding retina, the appearance of which was in marked contrast to that of the disc, the latter being decidedly pink, the former almost pale gray and opaque. The vessels, both arteries and veins, appeared very pale and small, but otherwise normal, and it was quite impossible to produce the slightest pulsation of either of them, even by compressing the globe as hard as the patient could bear it; the smaller branches seemed to be hidden under the opaque retina a short distance from the optic disc. The region of the retina around the macula was greatly infiltrated, swollen, and very pale, but the fovea centralis presented the characteristic appearance of a perfectly round cherry-colored spot of the apparent size of the head of a large pin, which, on account of the surrounding pale retina, was rendered all the more brilliant. *There was no perception of light*, but the patient had no disagreeable sensation whatever about the eye.

My diagnosis of embolism of the central artery of the retina being made, and the history of a great number of rheumatic attacks, and that of a paresis of the right arm being elicited, I had her heart examined by Dr. E. S. Warner, who reported that there was moderate hypertrophy with marked regurgitation at the mitral, and slight murmurs in the region of the aortic valve; her pulse was 92, compressible and irregular, and the patient somewhat anæmic. Hoping that, by increasing the power of the heart, I might be able to force the embolus from its location, which I supposed to be in the main artery, into one of the branches, and thus limit the bad results to a

portion of the eye only, I commenced to administer the tincture of digitalis. The patient took five drops of a good and reliable tincture of digitalis three times a day, and at the next visit I was surprised to hear that the upper part of her visual field had so far improved that she could distinguish large objects, such as the hand, for instance, and see the ceiling of the room, but could not distinguish a piece of chalk sufficiently to have the field of vision mapped out carefully. The ophthalmoscopic appearance of the retina was not much changed, but the lower branch of the artery appeared to contain more blood than before, and in the upper one, near the place of the first branching-off vessel, an obstruction could be seen; it resembled a colorless fibrinous mass, but it did not seem to obstruct the artery completely, as a very fine column of blood, resembling a thin red thread, could be seen at the nasal side of the plug; the vessel appeared well filled up to this point, but no circulation could be noticed beyond this point. The following day the upper part of the field of vision was decidedly clearer, and there was slightly less limitation of the field. The apparent embolus had evidently contracted, and had been carried upward to a bifurcation of the main branch, leaving the smaller branch, which it had previously obstructed, free. It was now possible to produce pulsation of the lower and main branch, and the appearance of the lower part of the retina was decidedly improved, having now a decided pinkish hue; but the upper part of the retina remained unchanged. The disc itself was now decidedly hyperæmic, and it evidently derived its blood-supply from a portion of the artery that had never been affected by the embolus. The region of the macula lutea presented still the above-described changes, but the color of the red spot was a little paler, and its outline not so clearly defined.

Her vision at this time was $=\frac{5}{200}$, and her field of vision is represented in Fig. 1.

The patient was now given the same amount of digitalis and one-fortieth of a grain of strychnia three times a day. The eye began soon to disturb the vision of the good eye, on account of its confusing effect, and the patient had to wear dark glasses, or a patch over the afflicted eye, in order to overcome a dizziness when walking. For the next week the changes were slight, both in the size of the visual field and in the acuity of vision. The optic disc, however, presented now the appearance we are so apt to see in a mild case of optic neuritis. The cherry-colored spot in the region of the macula, and the paleness of the surrounding retina, was, however,

only slightly changed. It was at this stage that the patient was presented to the New York Ophthalmological Society.

Her heart acting perfectly regularly, and the pulse being down to 72 per minute, the treatment was changed now to the administration of strychnia and the use of electricity. Under this treatment the vision of the patient improved, so that it rose to $\frac{20}{cc}$, and has remained the same to this date. The defect of the field of vision improved only slightly (see Fig. 2). The ophthalmoscopic appearance is now, after the gradual disappearance of the œdematous condition of the retina, still decidedly pale in the region of the macula lutea, and the fovea still shows as a marked, but not so intensely colored, red spot, of the same size as when first seen. The appear-

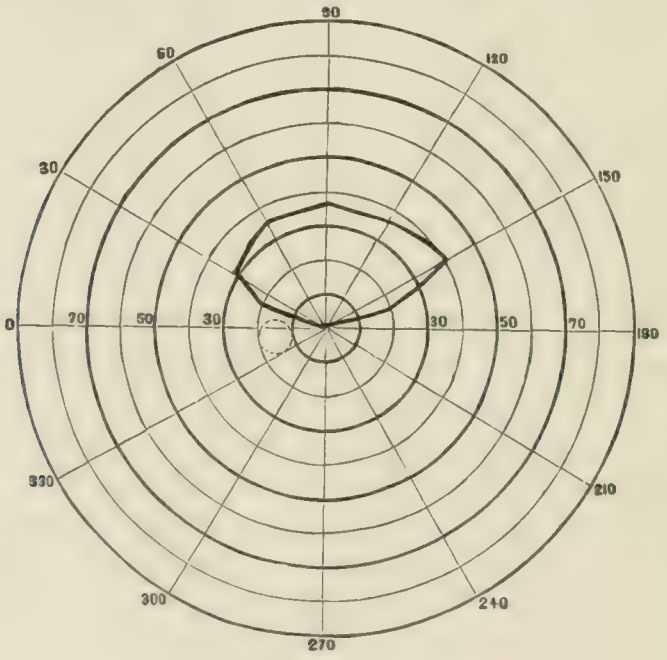


FIG. 1.

ance of the fundus of the good eye is that of a dark, abundantly pigmented one, and the macula presents only the usual picture.

Case II. is that of Mr. S., a literary gentleman, thirty-eight years old, of ordinary size, born in Westminster, Maryland ; married ; never had sore eyes nor weak sight ; his general health had been more or less delicate in early life ; he had repeated attacks of malaria, and a very severe attack of acute inflammatory rheumatism in January, 1874, which lasted several months, attacking nearly all parts of the body ; but since his recovery from the effects of this attack, in 1875, he has enjoyed perfect health. He has always used tobacco and coffee freely from childhood. On the 24th of Novem-

ber, 1881, he went to business as usual, feeling perfectly well. He had to run and jump to reach the ferry-boat ; later he ran up several flights of stairs, and after going into the composing-room attached to his office he felt as if his eyelid had closed on the right eye ; in fact, he found that he could not see, except that he could distinguish light at the extreme temporal side, but no objects. I saw the patient within three hours after the attack, and found that the retina was blanched, especially near the macula, and that the fovea showed a well-marked cherry-colored spot, perfectly round, and of the size of the head of a pin, about 2 mm. in diameter by direct examination. All the large vessels of the disk were apparently bloodless,

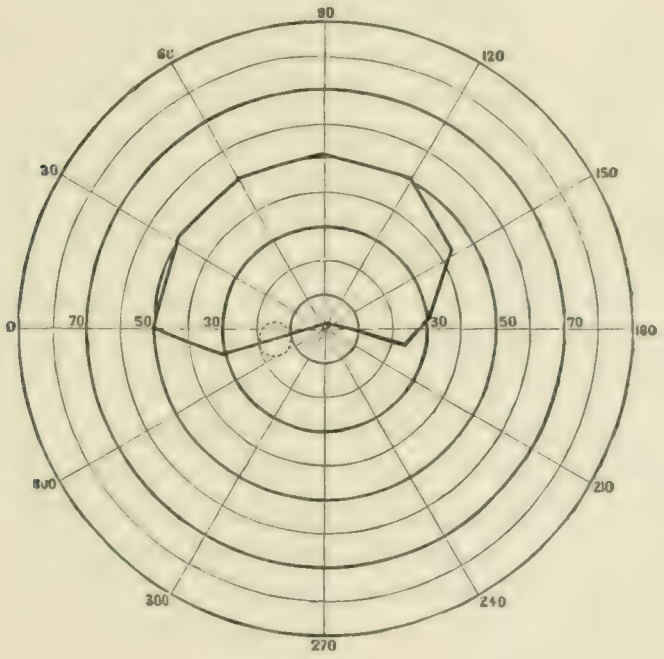


Fig. 2.

and pulsation of either arteries or veins could not be produced, while in the left eye this could be done promptly. His vision was nearly gone, except to distinguish between light and darkness if the light was removed over to the temporal side. His pulse was 102, and quite irregular in beat and force. "The heart is slightly hypertrophied, and murmurs are heard faintly, but distinctly, both over mitral and aortic valve" (Dr. E. S. Warner). The smaller vessels were so much alike in color that it was difficult to distinguish between arteries and veins, and parts of them were apparently bloodless ; other portions seemed to contain blood, but no movement of this could ever be seen. The optic disc itself looked gray

and hazy, had a moderately large physiological excavation, and especially the temporal half of its outline was very indistinct ; only a few of the smaller nutrient vessels could be seen, and even in these no movement or change of the column of blood could be noticed, which was so marked in Jaeger's case.

My diagnosis of embolism of the central artery of the retina was confirmed by Dr. Derby, who saw the case two days later. The changes in the interior of the eye went rapidly into an atrophic stage. The optic disc, which in the beginning looked hazy, but red in contrast to the blanched retina, became paler every day, and within two weeks the fundus revealed a perfect picture of white atrophy. The arteries became like fine threads and the smaller ones disappeared entirely near the periphery. The veins also became smaller. Quite a number of the peripheral veins underwent degenerative changes, which were followed by numerous fusiform hemorrhages. The case at this stage might have been taken easily for one of *retinitis hemorrhagica.* Thrombosis of these veins was evidently caused by the stagnation of the blood in these vessels. Several of the smaller veins extending almost up to the cherry-colored spot at the fovea centralis, and especially four running downward from above and one from below running up to the macula, presented, with the succeeding hemorrhages, a very unique ophthalmoscopic picture. (Appearances of this kind have been observed by Mauthner and Blessig.) There were evidently also hemorrhagic extravasations in the fovea itself, for the cherry-colored spot became larger, almost of the size of the papilla, darker and more irregular in shape, like Blessig's case, but more distinctly so. Later the hemorrhages gradually disappeared, and also the entire red spot at the macula became absorbed, leaving three or four white dots visible at this point. The retina resumed gradually a more natural aspect, but the nerve remained very white. The larger vessels are still visible, running over the disc, the arteries like two pale red threads, the veins appearing small, but darker ; but the smaller branches of the retinal circulation have entirely disappeared. His vision did not come back, but, strange to say, there were two small vessels to be seen at the lower and nasal side of the edge of the papilla, that had not undergone any changes. They are probably ciliary vessels, an artery and its accompanying vein, and are evidently supplying a portion of the retina near the optic disc, and it is this part of the retina that gives the patient some vision at the temporal side. His field of vision corresponds exactly to the location of these vessels. Reaching on

the one side to the blind spot (see map), it extends in the form of a long, narrow ellipse nearly to the periphery; from 20° to 50°. The vision of this portion of the field rose from perception of light shortly after the attack to $\frac{1}{10}$ at the present time; he can read S. 20 at about 10 inches (see Fig. 3).

The treatment consisted in the administration of digitalis in the beginning, which was continued for several weeks; then as the pulse and the action of the heart improved, strychnia was given, $\frac{1}{32}$ of a grain three times a day, and electricity was used twice a week.

These two cases, although so similar in many respects, differ in other ways very materially. Both occurred in persons that suffered

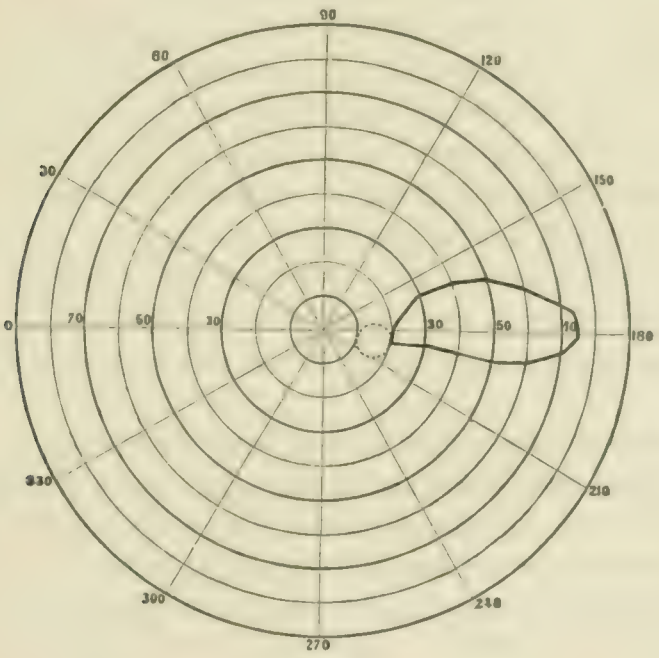


Fig. 3.

previously from inflammatory rheumatism; both had valvular lesions of the heart; they were perfectly well and had no renal trouble at the time of the attack. The onset of the disease was sudden, and occurred after violent exercise in both patients, and the ophthalmoscopic appearance of the fundi was almost alike shortly after the occurrence. But here the similarity ends. In the first case the embolus became dislodged, be it due to the shrinking of the obstructing body or to an increased force in the action of the heart; it entered the upper branch of the artery, where it could be distinctly seen by means of the ophthalmoscope, and on the third day it changed its position again, higher in the artery and near the upper portion of the disc, where it became permanently fixed. The vision of the pa-

tient underwent corresponding changes; from total darkness of the first two days the upper part of the field became clearer and larger until she regained a vision of $\frac{20}{CC}$, and a large portion, in fact, more than the upper half of her peripheral vision.

The second case presents an unusually favorable collateral circulation due to a ciliary vessel, which probably established an anastomosis with the retinal circulation before the attack, but served later to supply a considerable portion of the retina, giving a most valuable amount of sight in the eye, which eventually runs up to $\frac{10}{CC}$.

The embolus, however, is firmly lodged in the main artery, and probably high up. (In A. Sichel's case the embolus was found 5 mm. from the lamina cribrosa.) This would explain why the nutrient vessels of the nerve were early affected, as according to Leber and Schwalbe they are chiefly derived from the central artery, and as a result of it atrophic changes set in very soon, whilst in the first case, where the embolus was near the lamina cribrosa, and later, only in a branch of the artery, the optic disc became hyperæmic from the beginning, resembling almost a neuritis, and appears now, ten months after the attack, quite normal. With the second patient thrombosis of the veins followed the primary attack very soon, and retinal hemorrhages became abundant. In the first case we have nothing of the kind.

The fovea centralis, which in both cases had the usual appearance of a round, red spot, remained in this state up to the present time, many months after the attack, in the first case; but this red spot disappeared soon under hemorrhagic effusions in the second one, and the retina underwent atrophic changes in this region, so that not even the usual redness is visible. In this case we must assume that the choroid became implicated in the atrophic change, or that remains of the hemorrhages, colorless themselves, prevented the reflex of the choroid being seen. In the first case, that of obstruction of a branch of the artery, no atrophic changes of any importance take place, but the disturbance in the retinal circulations affect the choroid sufficiently to keep it in a more or less hyperæmic state, according to Stellwag, which explains the permanency of the cherry-colored spot at the fovea centralis.

The tension of the eyes, both in the first and second case, remained normal all the time, and no glaucomatous symptoms were noticed, which became so prominent in Nettleship's and Loring's cases.

The third case that came under my notice, is that of Mr. G., a German, forty-two years of age, who had suffered from repeated at-

tacks of rheumatism, but never had any serious trouble with his eyes, and had enjoyed good vision up to the time of the present attack. In the latter part of the summer of 1880, one evening, as he was lifting up the heavy shutters of his store windows rather hurriedly, he felt as if something was giving way in his left eye, and on closing the right one found that he was entirely blind in the left eye. As there was no pain or unpleasant sensation in the eye, he went home, hoping that by the next morning he would be able to see again. But he was disappointed in this, and came to me for advice the following afternoon. I found now that the central vision, as well as the nasal half of the field of vision of the left eye was entirely gone, but that he had a large portion of the temporal part of the field left, in which his vision was = $\frac{5}{5}$. The eye itself appeared perfectly normal. On ophthalmoscopic examination I found the optic papilla slightly congested, hazy, and its outline blurred. The larger vessels of the disc showed hardly any changes, except that they appeared smaller than usual. The temporal half of the retina, especially in the region of the macula lutea, was greatly changed; the œdematous infiltration rendered it almost bluish white. It resembled very much a detached retina, but in the fovea centralis appeared a well-marked, cherry-colored, round spot, of the size usually seen in such affections. No hemorrhages, which I had expected to find, could be seen. Pulsation of the vessels could not be produced; but the seat of the obstruction was not to be found. The arrangement of the two principal branches of the central artery of the retina, however, was peculiar, the upper one supplying almost entirely the upper and temporal and parts of the lower and outer portion of the retina, the lower branch, which was considerably smaller than the upper one, went almost entirely to the lower and inner section of the retina.

Supposing that this was an embolus of the upper branch of the central artery of the retina, I mapped out the field very carefully, and it corresponded exactly with the peculiar distribution of the vessels which I had observed by means of the ophthalmoscope (see Fig. 4).

On examination of the heart, I found distinct mitral regurgitation and great irregularity of action.

Unfortunately the patient never returned, and I know nothing of the subsequent history of the case.

My plan of treatment consisted in the use of heart-tonics, and fearing to stimulate the heart too much by nitrite of amyl, which might possibly have started another embolus, I gave digitalis, and

with excellent results in regard to the heart-symptoms, and probably also in regard to dislodging the embolus. An iridectomy or paracentesis, which have been recommended, seemed to be of such doubtful value that I did not like to resort to them.

Later, I have given strychnia and electricity as nerve-tonics, in order to improve that portion of the retina where the nerve-elements remained in fair condition.

The diagnosis of these cases was made comparatively easy, (1) by the suddenness of the onset of the disease, (2) the great impairment, or even total loss of vision, (3) the history of previous attacks of rheumatism, and (4) the coexisting heart lesions.

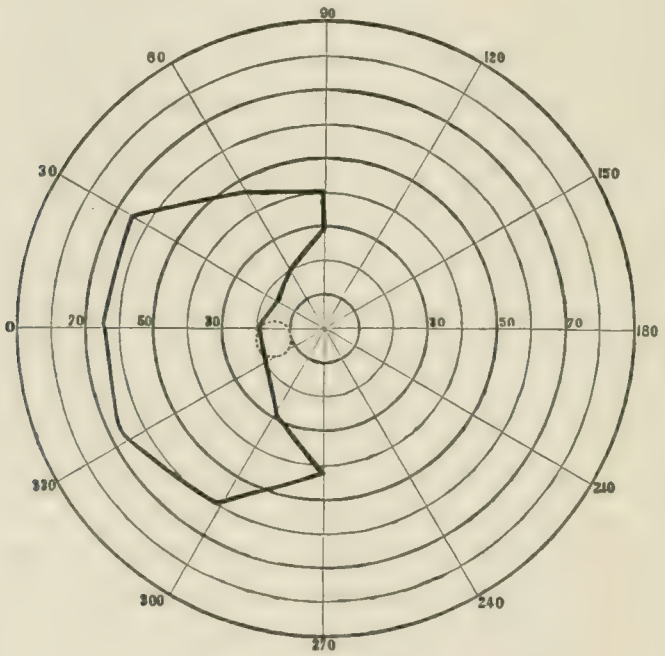


FIG. 4.

It has also been evident that the appearance of the optic disc as well as the prognosis depends upon the location of the obstruction ; if this is far up in the main artery, the prognosis is bad, and the optic disc must soon undergo atrophic changes, as, according to Leber and Schwalbe, the nerve receives a good deal of its nutrition from branches of this artery. If the obstruction is near the lamina cribrosa, or in one of the branches, the prognosis is not so bad, and the hyperæmia of the disc, which is apt to follow, may resemble a neuritis.

If these cases had been seen at a later stage for the first time, they would have been very difficult to differentiate from thrombosis

of the retinal veins, retinitis hemorrhagica, or atrophy of the optic nerve, and affections of this kind may occur more frequently than is thought at present. It is also apparent from the nature of the disease, that but little can be expected from the treatment, and that digitalis is perhaps the best remedy at our disposal to improve the action of the heart and the general circulation, thus favoring the establishment of collateral circulation. Pilocarpine has apparently helped to relieve the œdematous condition of the retina, but it has had no effect on the sight in Stellwag's last case. The use of electricity and strychnia, if any function of the retina remains, would recommend itself from general principles.

OPHTHALMIC NOTES.

(1.) DOUBLE GLAUCOMA FULMINANS—(2.) EXTRACTION OF A PIECE OF IRON FROM THE LENS BY MEANS OF THE PERMANENT MAGNET.

BY S. B. ST. JOHN, M.D.,
HARTFORD, CONN.

CASE I.—*Double Glaucoma Fulminans.*—On February 11, 1882, I was sent for to go into the country to see Mrs. L. I found a lady of fifty, who had been ailing for some weeks with dyspeptic and rheumatic symptoms, but was recovering, so as to be about the house. No previous eye trouble had been observed. On the afternoon of the 9th her left eye suddenly felt as if something had gotten into it, but nothing could be seen by her friends, who examined it and remarked upon the enlargement of the pupil. In an hour or two vision became dimmed, and in six hours agonizing pain set in, which was at last quieted by morphine, and did not return except in a very moderate degree. The vision steadily declined. I found conjunctiva chemosed, lids swollen, cornea anæsthetic and hazy, pupil dilated, no reflex from fundus, T. + 2, and V. = perception of fingers at 6″. An iridectomy was at once done under anæsthesia and eserine instilled. Eserine was left with the family physician, to be used in case of an attack in the fellow eye. On the 16th I was called again on account of pain in

the right eye, which I found the counterpart of the left when I first saw her, except that the pupil was not dilated. Pain had set in upon the 12th; eserine had been freely used, and the pain had never been very severe. Iridectomy was done at once. The patient made a good recovery; and May 30th, after correction of refractive errors, o. d. V. = $\frac{15}{XXX}$, o. s. V. = $\frac{15}{LXX}$ (with some slight opacity of pupil, due to deposit upon anterior capsule).

I present the case because of the comparative infrequency of glaucoma fulminans, and also because of the short interval elapsing between the two outbreaks of inflammation.

CASE II.—*Extraction of a Piece of Iron from the Lens by means of the Permanent Magnet.*—On January 31st, Michael H., a blacksmith, twenty-two years old, applied to me for relief from an inflammation in his left eye. He said that, three months before, while shoeing an ox, he felt something strike his eye. He had some pain, and vision was considerably impaired, but he did not give it much thought till January 10th, when it became very painful, and had remained so, while the vision of the fellow eye had become impaired also. I found left eye in a state of active iritis, with posterior synechiæ; lens densely white, and at upper part of pupil, and apparently extending behind the margin of the iris, is a rust-colored spot, in which is a black point; T. — 1; eyeball sensitive; V. = perception of light. Right eye slightly tender; photophobia marked; V. = $\frac{15}{LXX}$. Patient was etherized and incision made as for extraction by Graefe's method. Upon seizing the iris with the iris-forceps in the attempt to pull it out, to make an iridectomy, the traction upon the adhesions ruptured the capsule, and softened lens-matter was extruded into the anterior chamber, carrying the black speck with it. The point of a Gruening magnet was introduced through the incision into the lens mass, and upon withdrawal it was found to have a small fragment of iron adhering to it, not more than double the size of a period-mark in print. The case did very well; the symptoms of sympathetic irritation subsided and vision improved.

I present the case, as illustrating one of the means at our command for dealing with minute fragments of iron or steel when situated in the lens or entangled in the iris, where there is danger that in our efforts to remove them with forceps they may elude our grasp and fall to the bottom of the anterior chamber. I believe the use of the magnet always justifiable where, in cases of traumatic cata-

ract, there is a strong suspicion that a minute fragment of iron is imbedded in the lens, and where it is deemed best to operate for the removal of the opaque lens.

REMARKS.

DR. J. S. PROUT, of Brooklyn, wished to say a word with regard to sclerotomy. He had obtained, by Wecker's method, a very satisfactory result in a case of chronic simple glaucoma that originated in retinitis hemorrhagica. To lessen the difficulty of the operation, which is more delicate and difficult than an ordinary iridectomy, he proposed the following method: To make with a *double-pointed* keratome two incisions at the corneo-scleral margin, between which shall be left a bridge of tissue one-sixteenth inch wide. The incisions are then to be enlarged to the desired extent by means of McDowell's scissors, modified so as to have blunt points, and blades curved to *about* the curve of the corneal margin. By means of these instruments (made for him by Shepard & Dudley) he thought the operation would be an easier one to make than by Wecker's method, and incisions of one-fourth of an inch (=6 mm.) on each side of the central bridge can be obtained without danger.

PREMATURE DELIVERY FOR THE PREVENTION OF BLINDNESS.

BY EDWARD G. LORING, M.D.,

NEW YORK.

So far as I know, and so far as I have been able to inform myself by inquiries among my professional brethren, premature delivery for the sole purpose of preventing blindness has never, up to the present time, been performed, or even advocated.

In suggesting any new remedy, or remedial procedure, especially in so conservative an art as medicine, two things ought to be considered: first, whether there is any necessity for the remedy proposed; and, second, whether the advantages attending its adoption will outweigh the evil effects which exist before the remedy was suggested.

First, as to the necessity of the operation.

It has been long known that pregnant women, especially toward the end of gestation, were liable to suffer from a disturbance of vi-

sion, which might vary from the slightest deterioration to a total and permanent blindness.

Physicians were well aware of this fact long before the true condition of retinitis albuminurica or uræmic amaurosis was known, that is to say, prior to the time of Bright, and long before the invention of the ophthalmoscope.

The fact, therefore, admitted, that possible and under some conditions inevitable blindness may ensue, the question reduces itself to the simple inquiry, whether premature delivery is ever justifiable, either for the restoration or preservation of sight.

It appears to the writer that there are not a few cases in which it is not only justifiable, but where the true principles of sound practice demand its adoption.

The reasons for this belief will perhaps be better explained by the following cases, which are cited simply as useful examples of what may happen, and not infrequently does happen, either directly or indirectly in the experience of every physician and oculist.

The following case is reported by Mr. Robert Lee,[1] the particulars being furnished to him by Mr. Bowman.

On December 7th, Mr. Bowman was consulted by a lady who was pregnant, and "who had rather suddenly lost her sight in great measure." The urine was found to be excessively loaded with albumen. At Mr. Bowman's suggestion the patient consulted Mr. Paget and Dr. West, who anticipated, Mr. Bowman says, as he did himself, "that the confinement would be attended with convulsions of a dangerous character." On January 9th, or one month later, the patient had a premature confinement of a male fœtus, which was still-born. The patient gradually regained her health and strength, but Mr. Bowman regrets to state that the sight has only partially returned.

The first thing which strikes one here is that there was a permanent loss of vision, and the question arises, whether something might not have been done to prevent it. It is stated that on December 7th the patient had rather suddenly lost her sight, and if there ever was a chance of saving it, it was by getting rid of the cause as soon as possible, as it is universally acknowledged by all oculists that the sooner the delivery takes place the better the prognosis for sight. Nothing, however, was done, notwithstanding the fact that the three attending physicians, all men of great eminence,

[1] Medico-Chirurg. Trans., Vol. XLVI., p. 171.

had announced that they anticipated that when the confinement did take place it would be attended with dangerous convulsions, and the woman would have been allowed to remain blind to the end of her term unless nature had stepped in with a premature birth. At any rate, she was allowed to remain blind for an entire month, with the urine loaded with albumen ; and what a month's delay, under these circumstances, will, and often does, produce in so delicate a tissue as that of the retina and optic nerves is too well known to need any comment. Would it not have been better practice, nay, was it not the bounden duty of the surgeons in a case in which a great degree of blindness was actually present, and danger to life anticipated, to have produced premature delivery, and not waited for an entire month for the chance intervention of nature, and to have in the end to regret that "the sight had only partially been restored?" Does not the mere fact that the sight did partially return after the patient had lost it in a great measure for a month, show that if the delivery had taken place earlier there would have been every chance of its being fully restored? and is the sight of a woman, in the prime of life, of so little account that no effort should be made, or no risks run, to prevent its loss, especially when it is anticipated that later on there will be danger to her life itself?

The literature for the last half century, as everybody is aware, is full of such cases, and that related above is cited simply for purposes of illustration.

The following case, by Mr. Lawson,[1] is a sad example of the misery which may be entailed upon a patient by recurrent attacks of blindness occurring in successive pregnancies.

B. S., aged forty-one, applied to the hospital on December 2d of this year, suffering from the following amaurotic symptoms. She was the mother of nine children, six of whom were now living. She said that in the second month of her pregnancy with her *eighth* child her sight began to fail her, and continued to get worse until the termination of her pregnancy. She could then only see large objects ; she could not count fingers, nor tell a man from a woman ; she could merely see that something large was in front of her. After the birth of her child her sight began to improve, but not until after she had begun regularly to suckle it, and in three months' time she was able to read her bible, the print of which was about the size of No. 10 Jaeger, and she could not only see to do needlework, but actually

[1] Ophthal. Hosp. Reports, Vol. IV. p. 65.

did it. In this state she continued for two years, when she again became pregnant with her *ninth* child, and her sight at about the second month again began to fail her, and continued to diminish until at the ninth month she could see no more than she did at the time of her previous confinement. After the birth of this child her sight only slightly improved compared with the improvement which followed the birth of the previous one. This she attributes to the fact of her being unable to suckle her child on account of her bad health. She regained, however, sufficient vision to be able to walk about unguided and to carry her child with her in the streets; and although she could easily distinguish the faces of her friends, still she had not sufficient sight to be able to read or write. Eighteen months has elapsed, and she is now pregnant with her *tenth* child. The increased impairment of vision came on about the second month, as on the two previous occasions, but her sight has failed her this time much more rapidly, and on this account she applied to the hospital.

She is now six months advanced in pregnancy, and the following is the condition of her sight: Right eye—No perception of light, pupil fixed and widely dilated; left eye—is unable to count fingers, but at eight inches can just make out the hand, pupil dilated, but with a very slight range of action.

Examined with the ophthalmoscope, the optic entrance looks small, of a bluish pearly white, the arteries appear like mere threads, while the veins are very large.

She suffers now, and has suffered during her pregnancies with pain at the top and back of her head. The least noise "seems to bewilder her," and she arises in the morning with headache. She has no loss of power in any of her limbs; but looks thin and haggard, having the appearance of one who has gone through much trouble.

A striking feature in this case, and one which is thought to be uncommon, though it is by no means so rare as is supposed, is that the vision began to fail so early in the pregnancy, that is about the second month, and that it occurred in three successive pregnancies at this time. Now, notwithstanding this fact, and that with each pregnancy there was an additional and serious increase in the loss of sight, the patient was allowed to go through three successive pregnancies until she became almost totally blind, without an effort being made to prevent it. No wonder she looked, as the reporter of the case expresses it, "thin and haggard, having the appearance of one who has gone through much trouble." To be blind at forty-one,

with eight or ten children to look after, is not a cheerful prospect for any woman. To be allowed to become so, through a succession of years, would seem, if possible, only to add to the misery. Other cases, precisely similar, might be cited here, as they are familiar to every accoucheur.

Such being the condition of affairs, when matters are left to themselves, it remains to be seen what occurs when interfeernce, either natural or artificial, takes place, and in illustration of this, I would briefly cite another case from Mr. Lee:

On January 29, 1863, Mr. Lee saw a young lady in the third month of her pregnancy. She was suffering at that time from sensitiveness in the region of the uterus, sickness of stomach, and general nervous irritability, the pulse, however, was not very rapid, and there was no symptom to excite alarm. On March 21st, or two months later, he received a note from Mr. Bowman, desiring a consultation, as the patient had consulted him for defective vision. "The urine was loaded with albumen, and there was a destructive disease going on in the coats of the eye." As the patient was in the sixth month of her pregnancy, and as she seemed to be threatened with convulsions, and especially as these symptoms became urgent in the following three days, premature delivery was proposed by Mr. Lee, as he believed the affection of the kidneys and eyes arose from the pregnancy. Before, however, having recourse to this, it was considered proper to have a consultation with Dr. Robert Ferguson, who thought it unadvisable to induce premature labor, "chiefly on the ground, that the life of the child would necessarily be sacrificed, as the pregnancy had not advanced beyond the sixth month." It was determined, in consequence of this opinion, not to interfere, but to wait and see what course the disease would take. On April 10th, or three weeks later, there was an attack of convulsions, and as these were sufficient to excite apprehensions that fatal puerperal convulsions would take place, it was considered proper, after a second consultation, that premature labor should be induced immediately. This was successfully performed, and, with occasional drawbacks, the patient continued to recover for the next ten days, when she could distinctly see the figures on the dial of a watch.

The happy result in this case, and the restoration to vision was, it cannot be denied, due to the premature delivery which was induced, which removed the cause producing the loss of sight, and the only criticism to be made is, that it was not induced as speedily as it should have been, since the operation was delayed until danger-

ous convulsions had already taken place, notwithstanding the fact that precisely this result had been anticipated, and in spite also of the fact that "a destructive disease was going on in the coats of the eye, and that the urine was at the same time loaded with albumen." Neither would it seem that the reason given for the delay, that the life of the child would be sacrificed, was a good and sufficient one, since, from the very nature of the trouble and the condition of the mother, there was every reason to suppose that sooner or later, not only the life of the child was sure to be sacrificed, but also that of the mother would be imperilled. Here too the question narrows itself to whether the possible life of a sickly child ought to outweigh the probable loss of sight in the mother, and whether it is good practice or even justifiable to run such a risk.

A still more instructive case is reported by Brecht, of Berlin.[1]

A woman thirty-six years old, noticed in the third month of her sixth pregnancy a disturbance of her vision. In the fifth month, that is, two months later, she was seen by Dr. Brecht, who detected well-marked organic changes in the retina and optic nerve. The urine was highly albuminous. In October, or three months after the first notice of a loss of vision, eclamptic attacks took place, which lasted twenty-four hours, with a further reduction of vision to such a degree that the patient could not recognize persons in the room. After waiting some days, artificial premature labor was induced by the introduction of a catheter, which was accompanied by further convulsions. On the tenth day after the operation there was a manifest reduction in the quantity of albumen, and vision had improved to a considerable degree. Five weeks after the operation the vision in both eyes had returned to the normal amount (V. = 1). A year later some of the ophthalmoscopic appearances still remained, while others had entirely disappeared, but the vision in both eyes was still perfect.

The result here, like that in the former case, is all that could be wished for, but the same question arises, whether it would not have been better, from a clinical point of view, to have performed the operation at the third month, when the loss of vision was first noticed, instead of waiting until the fifth, when convulsions had already set in, and which surely vitiated the prognosis, not only as regards the preservation of sight, but also the life of the mother.

Brecht also reports a marvellous case of separation of both retinas

[1] Graefe's Archiv. für Ophth., B. XVIII., Abth. II., p. 111.

during gestation, and where readjustment of both retinas took place after a premature birth, which occurred without any artificial intervention. Others have reported similar cases, and the restoration of vision after parturition in cases of kidney disease dependent upon gestation, are so common as to need no comment.

In all the foregoing cases it will be noticed that no interference ever took place until the patient had actually been suffering from some grave constitutional disturbance.

The following case differs from those hitherto reported, in the fact that no such disturbance was present at the time of the operation.

E. B., aged thirty-five, consulted me for failing sight. The patient was a married woman, whose general health had always been good, the only departures from which condition were during her pregnancies. She had been married eight years, and had had three confinements in that time. Until within a short time of the birth of her first child she had had no loss of sight. She was, however, highly hypermetropic, and had been compelled on that account to wear glasses, especially for reading and sewing. She had never suffered any pain in her eyes, nor did she at the present time. She consulted me simply on account of failing vision. All other organs and functions seemed to be normal, and a careful examination as to heart, lungs, and kidneys gave no evidence of disease.

Her attention was first attracted to her eyes about two weeks before her confinement with her first child. She first noticed that she could not see people or objects when they were on the left side of the left eye. She stated that the trouble came on rather suddenly about two weeks before her delivery, when she noticed a dimness of vision in this part of the field. This seemed to her like a bright cloud or mist which was replaced in part at a later period by a broad dark band which ran like a stripe across a bright ground. After her confinement the bright ground disappeared, not, however, until her menses reappeared. The dark band, however, remained and no object could be seen when carried beyond a certain distance toward the left.

Just before her second confinement precisely the same thing occurred, and the dark band increased in breadth so much that she could not see objects with the left eye when she looked straight at them, in other words, central vision with this eye had begun to be affected, indeed, was so far gone that it was only by turning her head, so as to bring the objects into the temporal side of the retina, that they could be discerned at all. The "sight of this eye was

nearly all gone" but up to this time that of the right eye had remained unimpaired.

Just before her third confinement precisely the same thing occurred in her right eye, as had taken place with the left, and it was in regard to this that she came to consult me first, in October, 1879. This was three months after her confinement, and her vision began to fail two weeks prior to it. The patient was in much mental distress in regard to the loss of sight and the fear of approaching total blindness, and her bodily health was beginning to be undermined.

The examination of the eyes gave the following result, vision was entirely gone in the left eye with the exception of a quantitative perception of light in a narrow district of the inner field. Vision in the right eye was also so reduced that the patient could not, as she expressed it, tell the faces of her own children. She could barely count fingers at a few feet. In this eye, too, the field of vision was reduced at the outer side, that is to say, the nasal portion of each retina did not functionate.

There was no improvement of vision with glasses. The ophthalmoscope showed that the media were perfectly clear. The optic nerve gave the picture of white atrophy of that peculiar kind in which the capillary circulation seems to have suffered the most. In neither eye were there any capillaries whatever to be seen upon the disk, while the larger vessels seemed to have preserved their normal condition as to size and course. The light streak upon the vessels was well marked and there was no sign of any form of retinitis to be detected. Had it not been for the unmistakable and conspicuous whiteness of the disc, the fundus would have been pronounced normal.

As the case was a loss of vision incident to labor, careful and repeated examinations were made as to the condition of the kidneys, as well as the heart and lungs. No trace of albumen was ever found, nor was there any other departure from a normal standard in any of the other organs.

The treatment consisted at first in the use of injections of strychnia, which were carried to the very verge of toxical effects. Then the changes were rung on the mercurials, iodides, and tonics without the slightest avail, and at the end of a month, vision was no better than at the beginning of the treatment. At the end of this time the menses returned, and from that moment a gradual but decided improvement in sight took place, so that at the end of another month the patient could see with her right eye "to do almost anything." Tested accurately, the vision amounted to one-third of the

normal quantity (V. = $\frac{1}{3}$). There was, too, a reduction in the field of vision, and objects situated at the right of the median line were not as clear as on the nasal side of the field. The patient was, after a little longer interval of surveillance, in order to watch the case, dismissed with a caution to guard against any imprudent use of the eyes, and a most emphatic caution and warning, at the risk of her sight, if not her life, not to become pregnant again.

For the next eighteen months I saw no more of her, when she came to me in great alarm, because she was again "in the family way," and she feared from what I had said, and from her past experience, that if the child was carried to the full term she would become blind, and lose the entire sight of the right eye precisely as she had already lost that of the left. She informed me that she had already communicated the facts of her history, together with the warning I had given her, to her family physician, and at his instigation, she had called upon me to obtain my opinion as to the necessity of a premature delivery. I then made an examination of the eyes, and found that since I had seen the patient, not only had the vision not decreased, but had even improved, it being at the time of the examination, April, 1881, $\frac{2}{5}$ of the normal against $\frac{2}{6}$ of the year before. I could only repeat the warning that I had already given, that is, that at each pregnancy there had and always would be, not only danger to her sight, which in my opinion would inevitably be lost, but also that there was danger to her life. I reiterated that opinion when the family physician called upon me, and that I could see no escape if she was allowed to have another child, if not from death itself, at least from a doom that in my opinion was worse than death, that is, total blindness at an early age, with three or four young children dependent upon her. I was led to this conclusion from the fact that it was absolutely undeniable that the loss of vision was dependent upon the advanced condition of gestation, that the attacks did not come on until just before the time of delivery, and that each attack had been followed by a loss of vision, which had totally destroyed one eye, and had threatened destruction of the other, from which there had been a marvellous, but at the same time only partial recovery, and lastly, because during the past sixteen months, when the menses had been regular and the health restored, the remaining eye had not only not deteriorated, but had even improved in vision.

Premature delivery was produced on May 1st, when the fœtus was three months old. There was considerable reaction after the operation, the patient remaining in delicate health all the summer.

She returned to see me again in November, 1881, when she reported that notwithstanding all the sickness incident to her miscarriage, her vision had certainly become no worse, and she thought a little better; and this was shown to be the case, for the vision had risen to a little better than one-half of the normal amount, against two-fifths at the former examination. The ophthalmoscopic examination showed, however, the same appearances as to paleness of the optic nerve and want of capillary circulation. There was not a capillary to be seen upon the disc.

This is, so far as I know, the first case in which an abortion has been performed where the most prominent, if not the sole symptom, was a loss of vision. It is, however, not the first case in which, in my opinion, it should have been done, and I think if the importance of the matter was better appreciated the necessity for it might appear more frequent than is supposed. I have from time to time been consulted by women who have been confined within a shorter or longer period, and who have told me that they began to complain that their sight was becoming affected before their confinement, and that they had been assured by the attending physician that "it would come all right as soon as the child was born."

That it does come all right in some cases, or what appears to be all right, is often true, but there are many cases in which it not only does not come all right, but in which a deterioration of sight is sustained, which may vary from a slight impairment to an absolute loss of all useful vision. It happens as a common occurrence to the oculist to hear the first complaint in failing sight referred by the mother to about the time she had her first child. White atrophy of the optic nerve is certainly a rarer disease in women than in men, but, according to my own experience, it occurs much more frequently in women who are married than in those who are not, and at a much earlier age. I do not mean to say that in every case where atrophy is detected in a pregnant woman an abortion should be performed, but I do say that where it has occurred in one confinement, every precaution should be taken to explain the dangers of future confinements to the patient, and that in extreme cases, such as the one reported above, premature delivery should be performed rather than let the mother go blind, or run the fearful risk of going blind.

If this is true in regard to the comparatively rare disease of atrophy, it is doubly true in albuminuria, so much more frequently found in pregnant women, and with which we so frequently find the so-called retinitis albuminurica.

Very little attention, even at the present day, I find is paid by the general practitioner to the condition of the urine in pregnant women unless his attention is particularly called to it by some development in the symptoms or some derangement in function.

In the larger medical centres it is true that some very careful physicians do make an examination of the condition of the kidneys from time to time, even if there are no manifestations which make it a necessity; and I have been informed by such careful attendants that if any albumen is detected a strict watch is kept upon the condition of the eyes, and in case any complaint is made of the vision a careful examination is obtained, oftentimes at the hands of an expert, and with an invariable result, no matter how serious the inflammation of the retina may be, and that is, that the only course to pursue is to wait until the child is delivered, with the knowledge that the retinitis will subside as soon as the birth takes place, and with the hope that the delicate nervous elements involved will survive the secondary contraction and atrophy which will follow.

But it often happens that no complaint—not even the slightest—is made by the patient as to her eyes during the entire pregnancy, or at the time of her delivery, and yet a low stage of retinitis, or indeed one of great intensity may exist. Indeed, the vision may remain perfect, or nearly so, for a long time, and only begin to fail long after the active signs of inflammation have passed away and the secondary or atrophic stage sets in.

Thus I have seen women who only began to complain of a loss of sight some four or five months after their confinement, since the subsidence of the first or inflammatory stage had been so slow, and the advance of the secondary or atrophic stage so insidious that the patients themselves have not noticed the gradual loss of vision until they have been considerably affected, which then admonishes them to seek the advice of an oculist. I have certainly seen, if not many, still a goodly number of cases in which the patient herself did not attribute her loss of vision to her confinement but to some ulterior cause, but where, from the ophthalmoscopic appearances, the undoubted evidences of a retinitis albuminurica still existed, and where a close questioning of the patient or her attending physician corroborated the fact that such had existed for a longer or shorter period before the confinement.

It may be, and no doubt will be, urged that the reasons why no interference has taken place hitherto, until the patient was actually suffering from some grave constitutional trouble, which threatened

life, was, that such interference would be unjustifiable, both on moral and legal grounds.

As for the moral aspect of the case, or what in some minds passes for such, I have neither the time nor the inclination to go into so wide a field of discussion. There may be physicians who, as physicians, even unrestrained by legal considerations, might think it right that the highest and most useful of all our senses should be sacrificed rather than that any interference with the workings of nature should take place. From a mere medical standpoint it is hard to conceive of such a thing, and this is all that interests us here.

From a legal point of view it is also hard to conceive that there can be but one opinion, and that is in favor of the operation, when the circumstances are such as demand it. The law states that premature delivery shall not be performed, except for the preservation of the life of the mother or the child; and it is precisely for the "preservation of life" that it would be done, when the eyesight is threatened, for the one is part and parcel of the other, and in operating to save the sight, we are operating to save life. Thus Simpson, many years ago declared, and the opinion is universally upheld at the present day, that symptoms such as headache, giddiness, and derangement of sight, are merely premonitory symptoms of puerperal convulsions; and when these are associated with albumen we may be certain of the liability of our patient to the supervention of convulsions. Moreover, it so happens that these derangements of vision occur at a time, when, as Graefe puts it, "the prognosis for life is even worse than for sight." Given, therefore, a pregnant woman with loss of vision, or organic lesion of the retina or optic nerve, as the prominent, or even as the sole symptom, no one can say that a series of convulsions may not set in at any moment which will carry everything before them, including, not only the life of the child, but also that of the mother.

There is another point of great importance, and that is that where an attack of uræmic or albuminuric amaurosis occurs in one pregnancy, it is almost certain to repeat itself in the following ones, and if the life of the mother has been threatened in the one case, and from which fate there has been a lucky escape, it may also be threatened in the following pregnancies from which there may be no escape.

From the cases which have been reported above, and from the arguments based upon them, I would conclude, first, that examin-

ations as to the condition of the eyes of pregnant women should be made much more frequently than they now are, and that these should be made in a routine manner, even when the patient does not complain of any unusual disturbance, since it has been discovered that about one-third, or thirty-three per cent., of those who have an organic lesion of the retina or optic nerve from kidney trouble either have none or make no complaint of any reduction of vision. This seems almost incredible to the general practitioner; but the ophthalmologist has become only too painfully aware how often and for how long a time eyes may be affected with an inflammatory process of great intensity, and yet give rise to no complaint on the part of the patient.

Thus a retinitis, or a neuro-retinitis, which in its primary stage may exist and often does for months unsuspected by either the patient or physician, may lead, after a long interval, through the secondary or atrophic state to complete blindness.

From the fact that no complaint is made of any loss of sight until near the end of the pregnancy, it has been assumed that the trouble did not begin until that time. I am inclined to think, however, that while this is no doubt true, especially of the cases of uræmic origin, that there are very many cases, especially those dependent on albuminuria, in which the trouble really began long before, and that the eyes, if examined, would often have given evidence of disease, long, oftentimes months, before the explosion took place, which has cost many a mother her eyesight and oftentimes her life; both of which by a timely examination and a timely operation might have been saved. I will even go so far as to say that I believe that evidences of albuminuria not infrequently show themselves in the eye before any manifestations can be had in the urine.

It will be said at once that it is requiring too much of the general practitioner or obstetrician to suppose that he shall acquire the requisite skill to use so difficult and intricate an instrument as the ophthalmoscope. That the ophthalmoscope in its widest sense is one of the most difficult of the instruments used for the detection of disease is, I admit, perfectly true, as it is that few obtain a perfect mastery over it. But the same is true of the microscope—to one great microscopist there are thousands who daily use the instrument with the greatest success in the detection of disease, and it might with a little attention be the same with the ophthalmoscope. Much as I admire the high standard of skill which some of those specially trained to its use naturally acquire, nevertheless I firmly

believe that the sphere of its greatest usefulness, and therefore of its greatest triumphs, will one day be in the hands of the general physician and especially in those of the obstetrician. Thus Mr. Eales reports that a single physician was able to furnish him for examination from a single hospital in Birmingham twenty-eight cases of neuro-retinal disease from kidney trouble in one year, while out of eleven thousand cases of general eye disease at the Eye Infirmary only four such cases were seen.

Secondly, I would conclude that where a marked deterioration of vision had occurred with or without ophthalmoscopic changes, and where blindness is threatened, premature delivery is not only justifiable but often demanded.

Thirdly, when a permanent loss of vision has occurred from a preceding pregnancy, premature delivery in a subsequent one, when surrounded by its proper safeguards, is not only justifiable but at times absolutely necessary ; and that, further, when a loss of vision, either temporary or permanent, has once resulted from gestation, it is the duty of the family physician or obstetrician to explain both to the wife and husband that the cause of the trouble is a constitutional and not a local one, and that there is every probability of recurrence of the trouble in succeeding pregnancies, which may lead not only to the destruction of vision but even to loss of life.

CASE OF OSTEOMA OF THE CONJUNCTIVA.

(With Woodcut.)

BY EDWARD G. LORING, M.D.,

NEW YORK.

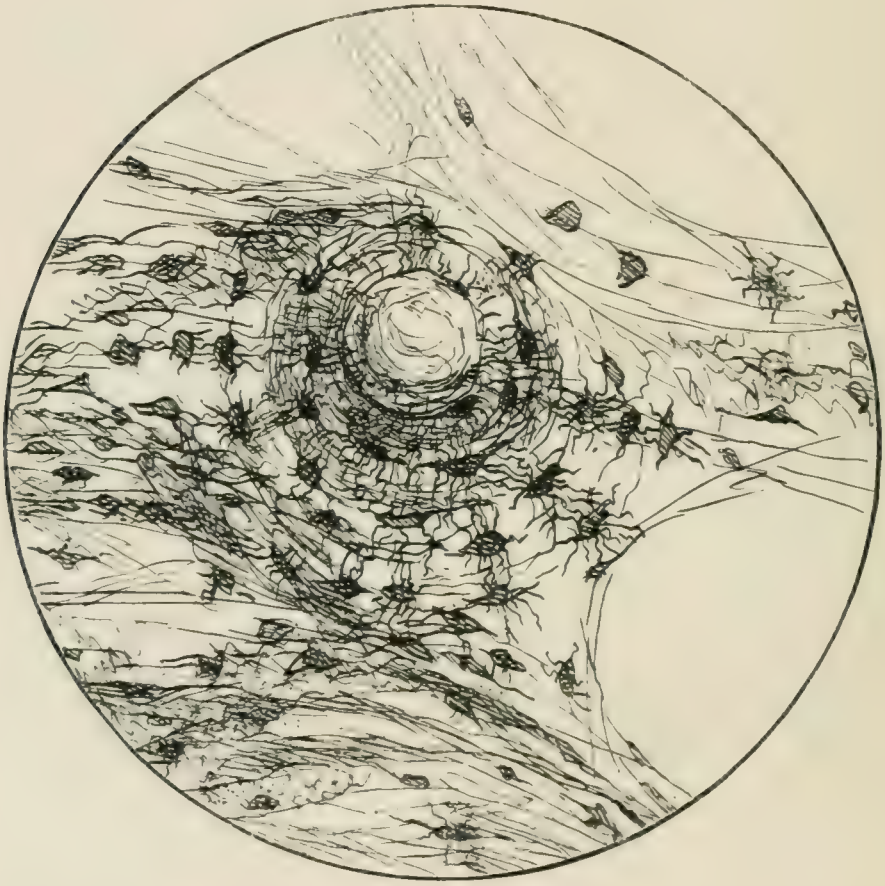
THE patient was a healthy and well-developed child of eight months. Just after its birth, a small fold of "skin," as the mother said, was noticed in the upper and outer angle of the eye. This fold began to be more and more apparent until the child was five months old, when it attained its present position and size, which have not changed during the last three months. The eye has never been at all red except to a trifling degree, and then only at times over the fleshy protuberance. Nor has there been any pain connected with it. The protuberance presented the appearance of a small oval cystic growth, midway between the outer angle of the eye and the edge of the cornea, and was in about the horizontal meridian. It was not until the forceps touched the mass after opening into the fold that its bony or cretaceous character was suspected. It was firmly attached to the conjunctiva above and at the sides, though it did not appear to be attached at all to the globe. The operation healed kindly, there only remaining, at the end of the fourth week, when the child was last seen, a slight injection along the wound.

The other eye was perfectly normal. The child has a slight nævoid-looking spot on each upper lid.

The weight of the mass was 45 milligrammes; length, 8 mm.; width, 5.5 mm.; height, 2.5 mm. It was oval in shape, with the long diameter in the horizontal meridian of the eye. It was convex above and concave below where it rested upon the sclera.

The specimen was given to Dr. W. H. Welch, and his report is as follows: The bony growth is enveloped in a thin fibrous capsule. The growth is found to consist of true bone. Thin slices removed with the scalpel show perfectly formed lacunæ and canaliculi. No large medullary spaces are found, but there are Haversian canals, around which the bone corpuscles are arranged in lamellar systems,

as will be seen from the drawing by Dr. Eno. The addition of acid to a fragment of the specimen causes an evolution of abundant bubbles of gas, leaving behind an organic residue.



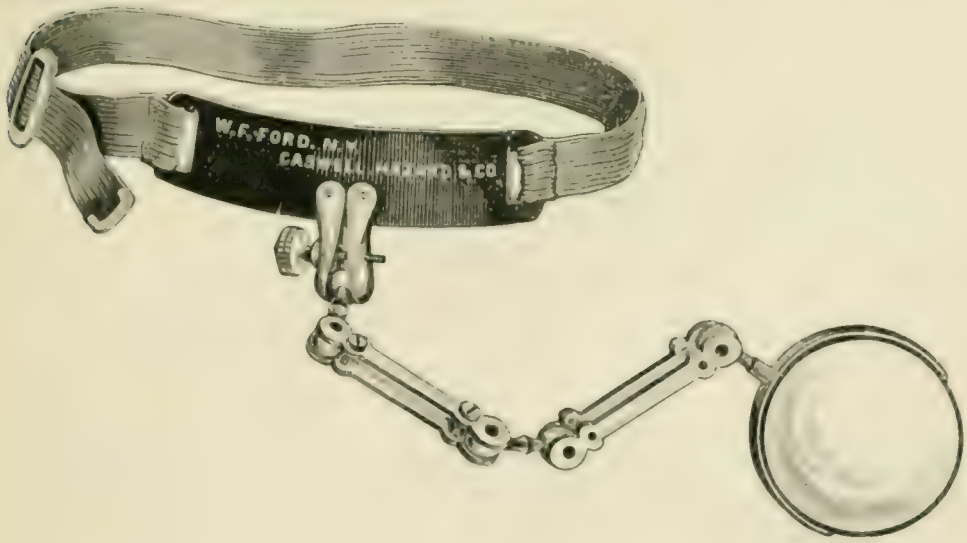
Dr. Welch reports that only two other cases which had been reported are known to him. These are found in Graefe and Saemisch's "Handbuch d. gesammt. Augenheilkunde," Bd. IV., Th. 2, p. 151, 1876. He finds no reference to any cases since then in Virchow and Hirsch's "Jahresbericht."

AN IMPROVED MEANS OF OBLIQUE ILLUMINATION—A CORNEAL CONDENSER.

With Woodcut.

BY EDWARD G. LORING, M.D.,
NEW YORK.

SINCE the introduction of the elevated railroads the frequency with which foreign bodies are found impacted in the cornea has increased so much that hardly a day passes that the ophthalmic surgeon is not called upon to remove one or more of these painful and oftentimes dangerous particles. This may occur not only at any hour of the day, but of the night as well, and in this latter case it is



extremely difficult, if not impossible, for the surgeon, without the aid of an assistant, to hold a condensing-lens to accomplish his object. This difficulty has, it is true, been obviated in a great measure by an ingenious contrivance described by Dr. Noyes, which consists of a lens so mounted that it can be worn by means of a spring clamp on the end of the first finger on the left hand of the operator. The amount of movement, however, is small, while to chock the eye

successfully with the index finger so encumbered, and at the same time keep the cornea illuminated, is a difficult operation and requires considerable practice and skill.

Mr. J. E. Adams, of London, described in the *Lancet*, February 7, 1880, a useful and ingenious little instrument, which consists of two lenses attached to a head-band, the plate of which is worn in the centre of the patient's forehead.

The modification of that idea consists, as shown in the drawing, of an arm, broken at the various points by ball-and-socket joints, so as to give a perfectly free adjustment to the lens in any direction, and at any distance up to the extreme length of the arm. This leaves both hands of the surgeon unencumbered, permits the use of fixation forceps if necessary, and does away with the necessity of an assistant to hold the lens.

The arm is attached to an elastic head-band, precisely like the head-band of an aural or laryngoscopical mirror. When in use the band is slipped over the head of the patient in such a way that the hard-rubber support comes at the temporal region and on the side of the eye to be illuminated, the lens then being swung into the position desired. By having the plate at the temporal region instead of in the centre of the forehead, as in Mr. Adams' instrument, and the lamp well at the side instead of directly in front, we get rid of annoying reflections of the lens in the cornea, and avoid the irritating effects of the light from a strong condensing lens thrown directly through the pupil upon patient's retina. If the lens is so arranged as to be a little within or a little without its focal length from the eye, the section of the cone of light is large enough to keep the cornea covered, even if the eye makes considerable excursions, while as the lens is attached to the patient's head, this latter can be moved to a considerable degree without displacing the illumination from the eye. I have found it of great service in operating upon delicate membranes in the pupillary space, as it gives a much steadier illumination, and one which is more easily controlled than when an assistant holds the lens.

By removing the lens from the clip and supplying a mirror, the instrument, from the character of its joints and the mutability of its position, can then be used as a fixed ophthalmoscope for the upright image, and can thus be used in demonstrating the fundus to a class or in making a sketch of it without the observer being compelled to take up and lay aside the instrument at every look ; or the upper

half of the ordinary ophthalmoscope can be inserted instead of a simple mirror, and then any optical combination that the refraction of the observed eye may require can be obtained.

I have had a band made which carries two lenses, one on a shorter arm, which is then used as a magnifying lens, but the single one answers every purpose, and for ordinary occasions is the most convenient.

The instrument is also very useful in magnifying small hairs, thus rendering their detection and removal much easier, or in performing any operation at night or whenever the light is poor. When, however, the light is sufficient, and only an increased enlargement is desired, the surgeon, by wearing the band on his own forehead and extending the arm to its utmost, can obtain a large amount of magnifying power, while by slight movements of the head he can successively inspect and keep in front any portion of the anterior surface of the eye or lid.

The instrument can be obtained of W. F. Ford, New York, and A. Keune, New Haven R. R. Building, Franklin Street, New York.

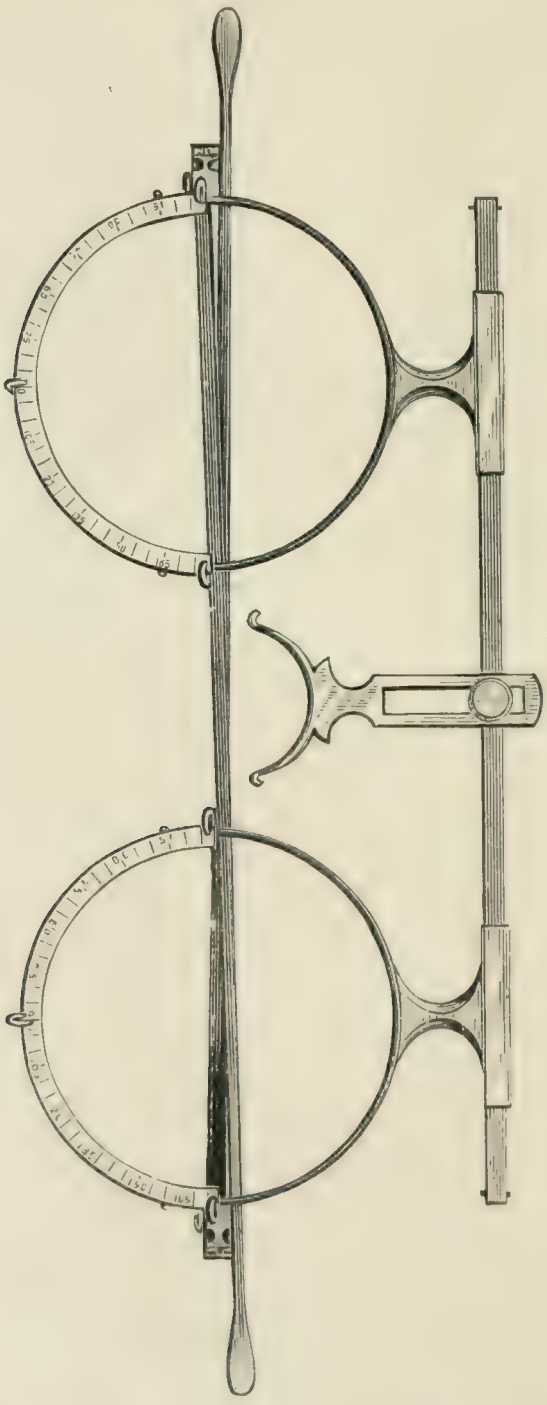
IMPROVED TRIAL FRAMES.

With a Woodcut.

BY G. C. HARLAN, M.D.,
PHILADELPHIA, PA.

THE convenience of the surgeon and the comfort of the patient depend so much upon the frames used to hold the glasses in testing refraction, that any attempt to contribute to their evolution toward greater perfection may not be considered beneath the attention of the Society. There are some objections to the different forms now in use which I have attempted to eliminate by combining their advantages. Those with the horizontal bar retain the lens with a piece of watch-spring, which is rather precarious in its hold, and is very liable to get out of order; while if the graduated grooved arc is deprived of the support of the bar it must be made undesirably heavy, or is sure to spread after a little use. In these frames the grooved

arc is attached to the lower half of a light ring, the top of which is connected with the bar by a sliding clamp. The groove is adapted



for one glass only, but there are hooks on each side of it which will accommodate two more. The nose-bridge slides up and down, and is fixed in any position.

TRANSACTIONS

OF THE

AMERICAN

OPHTHALMOLOGICAL SOCIETY

Nineteenth Annual Meeting.

CATSKILL MOUNTAINS, 1883.

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1883.

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NEW YORK.

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OF THE

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1883-84.

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DR. E. WILLIAMS.....Cincinnati, O.
DR. HENRY W. WILLIAMS.....Boston, Mass.
DR. J. P. WORRELL.....Terre Haute, Ind.

Total.....85

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DR. R. W. HOOPER.....Boston, Mass.
DR. C. SCHWEIGGER.....Berlin, Prussia.

Total..... 3
Whole number.....88

MINUTES OF THE PROCEEDINGS.

NINETEENTH ANNUAL MEETING.

HOTEL KAATERSKILL,
CATSKILL MOUNTAINS, *July* 18, 1883.

THE Society was called together at its nineteenth annual meeting at 10.30 A.M., by the President, DR. H. D. NOYES, of New York, who made a few congratulatory remarks, and then appointed the following committees :

Committee on Bulletin—DRS. F. B. LORING, of Washington, and E. W. BARTLETT, of Milwaukee.

Auditing Committee—DR. D. WEBSTER, New York.

Committee on Membership—DRS. J. GREEN, of St. Louis ; E. GRUENING, of New York ; O. F. WADSWORTH, of Boston ; S. THEOBALD, of Baltimore, and E. DYER, of Newport.

The Treasurer's report was read and referred. It was subsequently reported that the accounts and vouchers were correct and the report was accepted.

Dr. Green, on behalf of the Committee on Membership, recommended the following names: Dr. B. E. Fryer, U.S.A., Fort Leavenworth ; Dr. J. A. Andrews, Staten Island ; Dr. L. Webster Fox, Philadelphia ; Dr. James L. Minor, of New York, and these gentlemen were elected members of the Society.

The resignation of membership of Dr. T. G. Morton was read and accepted.

The President received the report of the Committee on

Bulletin, and called on Dr. Myles Standish to read Dr. H. Derby's paper.

1. "Influence on the Refraction of Four Years of College Life." The paper was discussed by Drs. Hutchinson, Webster, Mittendorf, Seely, Gruening, Carmalt, and Little.

2. "Some Improvements in Instruments and Appliances for Cataract Operations," by Dr. Murdoch. Discussed by Drs. Gruening, Noyes, and Theobald.

3. "Case of Tubercle of the Iris," by Dr. Schell. Discussed by Dr. H. D. Noyes.

4. "Case of Tuberculosis of Ciliary Muscle and Iris," by Dr. Wadsworth. Discussed by Drs. Prout, Gruening, and Webster.

5. "A Personal Experience with Prismatic Glasses," by Dr. McFarland. Discussed by Drs. Webster and McKay.

6. "On the Apparent Curvature of Surface Produced by Prisms," by Dr. Wadsworth.

7. "A Case of Sympathetic Neuro-Retinitis," by Dr. Spalding. Discussed by Drs. Webster, Kipp, Prout, Mittendorf, Schell, Theobald, H. W. Williams, Dyer, Green, Knapp, H. D. Noyes, Seely, and Buller.

8. "Thirty-five Cases of Cataract Extraction," by Dr. Webster. Discussed by Drs. Dixon, Strawbridge, Carmalt, and Noyes.

9. "Notes on Ocular Therapeutics," by Dr. Seely. Discussed by Drs. McKay, Hay, Gruening, Knapp, and Kipp.

The Society then adjourned to meet at 8 P.M.

The Society met at 8.30 P.M. The minutes of the morning session were read and approved. The order of Bulletin resumed.

10. "The Treatment of Detachment of the Retina," by Dr. W. F. Mittendorf. Discussed by Drs. Gruening, Little, Andrews, Spalding, Webster, and Theobald.

11. "Two Cases of Congenital Ectopia Lentis—the One Symmetrical, the Other Unsymmetrical"—by Dr. Little. Discussed by Dr. Mittendorf.

12. "The Employment of Nitrous Oxide Gas in Surgical Operations on the Eye," by Dr. Geo. T. Stevens. Discussed by Drs. Knapp, Strawbridge, H. D. Noyes, Buller, and R. H. Derby.

13. "A Contribution to the Operative Treatment of Glaucoma," by Dr. Heyl. Discussed by Drs. Webster, Noyes, and Seely.

14. "Some Additional Remarks on the Astigmatic Pencil," by Dr. Hay. Discussed by Dr. Knapp.

15. "Case of Sarcoma of the Choroid with Interesting Clinical Features," by Dr. Kipp. Discussed by Drs. Howe and Mittendorf.

16. "Case of Ossification of the Choroid, probably the Result of Congenital Disease of the Choroid," by Dr. Kipp.

17. "Trituration of the Cortex, with Preliminary Iridectomy," by Dr. Theobald. Discussed by Drs. Gruening, Kipp, Mittendorf, Knapp, Wadsworth, Webster, Fox, Noyes, Green, and Dyer.

The Society went into executive session.

The chairman of the Committee on Membership offered the name of Dr. E. E. Holt, Portland, Me., as candidate. Dr. Holt was elected.

The Society adjourned to meet at 9 A.M. of July 19th.

July 19th, 9.30 A.M.

The Society called to order by the President. The minutes of the last session read and approved. The Treasurer moved that the dues for the coming year be placed at five dollars. This motion was seconded and carried. The bulletin was again taken up.

18. "Vaseline Cerate—a Convenient Basis for Ointment intended for Application to the Eyelids," by Dr. Theobald. Discussed by Dr. Carmalt.

Dr. Knapp spoke in reference to Dr. Hay's paper of yesterday, as did Drs. Noyes, McKay, and Thomson.

19. "Blindness from Retinal Thrombosis in Consequence of Facial Erysipelas," by Dr. Knapp. Discussed by Drs. Buller, Kipp, Noyes, and Seely.

20. "Changes in Refraction, Resulting from a Blow," by Dr. Carmalt. Discussed by Drs. Knapp, Seely, Noyes, and F. B. Loring.

22. "Blepharoplasty, according to the English Method," by Dr. Gruening. Discussed by Drs. Howe, Green, Wadsworth, Knapp, Kipp, and Andrews.

25. "History of a Case Illustrating the Difficulty of Differential Diagnosis of Glioma," by Dr. Howe, with a specimen. Discussed by Drs. Andrews and Noyes.

26. "Commotio Retinæ from the Effects of an Indirect Blow," by Dr. Holt. Discussed by Drs. Theobald, Noyes, Seely, Webster, McKay, Gruening, Knapp, Kipp, and Wadsworth.

27. By title: "Two Cases of Ophthalmoplegia Externa, associated with Disease of the Optic Nerves from Brain Tumor, with an Account of the Post-Mortem Examination," by Dr. Bull.

Verbal communications were now received.

Dr. F. B. Loring referred to a case of fracture of the lens by hanging, as did Drs. Green and Howe. Dr. R. H. Derby also referred to three such cases which he had reported to the New York Ophthalmological Society. Dr. McKay spoke of a case of coloboma of the iris. Dr. Theobald showed a modification of his bandage. Dr. Mittendorf showed a preparation of jequirity bean, also of yellow oxide of mercury, and mydriatics and myotics in the form of an impalpable powder. Dr. Wadsworth spoke of the fact that a solution of eserine is not altered in power in consequence of a high color. Dr. Seely preferred an old solution.

The Society went into executive session.

The Chairman of the Business Committee spoke of a recommendation of the Otological Society, that Newport should be selected as the permanent place of meeting of this Society. The chairman made this recommendation. A vote was taken which resulted, for Newport 13, for Catskills 14.

Dr. Green moved a reconsideration of this vote, and that ballot be taken on place of meeting. In the first vote Coney

Island received 1; Thousands Islands, 1; Niagara Falls, 4; Catskills, 10; Newport, 13.

By motion the three places receiving the smallest number of votes were thrown out.

Vote was now taken and resulted, Catskills, 16; Newport, 11; and Catskills selected as place of meeting for next year.

The election of officers resulted as follows:

President—DR. H. D. NOYES.

Vice-President—DR. W. F. NORRIS.

Secretary and Treasurer—DR. RICHARD H. DERBY.

Corresponding Secretary—DR. J. S. PROUT.

Publishing Committee—DR. E. G. LORING, and DR. D. B. ST. JOHN ROOSA.

Adjourned.

Present at the nineteenth annual meeting:

DR. J. A. ANDREWS.
DR. E. W. BARTLETT.
DR. F. BULLER.
DR. W. H. CARMALT.
DR. RICHARD H. DERBY.
DR. E. DYER.
DR. L. WEBSTER FOX.
DR. JOHN GREEN.
DR. EMIL GRUENING.
DR. GUSTAVUS HAY.
DR. ALBERT G. HEYL.
DR. E. E. HOLT.
DR. LUCIEN HOWE.
DR. EDWIN HUTCHINSON.
DR. SAMUEL J. JONES.
DR. CHARLES J. KIPP.
DR. H. KNAPP.
DR. W. S. LITTLE.
DR. F. B. LORING.
DR. S. F. MCFARLAND.
DR. R. J. MCKAY.
DR. C. S. MERRILL.
DR. W. F. MITTENDORF.
DR. RUSSELL MURDOCH.
DR. HENRY D. NOYES.
DR. J. S. PROUT.
DR. H. S. SCHELL.
DR. W. W. SEELY.
DR. J. A. SPALDING.
DR. GEO. T. STEVENS.
DR. SAMUEL B. ST. JOHN.
DR. GEO. STRAWBRIDGE.
DR. SAMUEL THEOBALD.
DR. WILLIAM THOMSON.
DR. J. J. B. VERMYNE.
DR. O. F. WADSWORTH.
DR. DAVID WEBSTER.
DR. H. W. WILLIAMS.

Present by invitation:

DRS. T. Y. SUTPHEN, Newark; R. H. JOHNSON, Philadelphia; MYLES STANDISH, Boston; SWAN M. BURNETT, Washington.

RICHARD H. DERBY, M.D.,
Recording Secretary.

INFLUENCE ON THE REFRACTION OF FOUR YEARS OF COLLEGE LIFE. ILLUSTRATED BY THE STATISTICS OF THE LAST FOUR CLASSES GRADUATING FROM AMHERST COLLEGE.

BY HASKET DERBY, M.D.,

BOSTON, MASS.

AT the meeting of the Society, held in 1879, I presented [1] the statistics of refraction of the four classes entering Amherst College in the years 1875, '76, '77, and '78; as well as the figures furnished by the examination of the first of these classes just previous to its graduation. I have since examined the three remaining classes, at the time of their leaving college, and would now complete my task by combining and classifying all the results thus obtained.

Rejecting from the original number of 341 examined at entrance, those individuals who left their classes previous to graduating, I have been able, in 254 instances, to trace the refraction through the whole term of four years.

The examinations were all personally conducted with glasses, and in many cases, certainly in all doubtful ones, with the ophthalmoscope. The results given are those obtained by glasses. The use of atropine was wholly impracticable, as my investigations were made at a time when the full work of the term was going on, and the students could not possibly have been allowed to be even temporarily disabled from the active prosecution of their studies.

I have followed the example of Emmert and Loring in stating degrees of ametropia as slight as 0.5 D, but have included nothing less.

[1] See Transactions, vol. iii., part v., p. 530.

The average age of those whose examination is here recorded was, at entrance, nineteen; at graduation consequently twenty-three. This gave the whole investigation a peculiar interest. The number of cases at my command was, it is true, extremely small when compared with the ample statistics obtained by other observers here and abroad, but it was one of the few attempts yet on record to trace the modification of refraction among the more highly educated, during this particular period of life, and for a continuous term of years, and it offered some opportunity of testing the reliability of certain beliefs, long and generally held, with reference to possible changes in refraction at this age, and which will be referred to under the head of emmetropia.

The general results obtained may be grouped as follows:

	Refraction at entrance.	Refraction at graduation.
	Cases.	Cases.
Hypermetropia	39	47
Myopia	90	120
Emmetropia	125	87
	254	254

Furnishing the following percentage:

	At entrance.	At graduation.
Hypermetropia	15.4	18.5
Myopia	35.4	47.2
Emmetropia	49.2	34.3

Analyzing, now, the ametropia, I find under the head of manifest hypermetropia, of which there were 39 cases at entrance, 1 changed to myopia, 2 diminished, 27 remained stationary, 9 increased in amount. Average hypermetropia at entrance 0.7 D (0.698); average hypermetropia at graduation, the same.

I.—*Table of Changes in Hypermetropia during the Four Years.*

Entrance age.	Original refraction.	Changed to
16	Hypermetropia 1 D	Hypermetropia 1.25 D
18	" 0.5 D	" 0.75 D
19	" 0.75 D	" 1 D
18	" 0.75 D	" 1 D
18	" 0.5 D	" 1 D
17	" 0.5 D	" 0.75 D
18	" 3 D	" 3.5 D
19	" 1.75 D	" 2 D
18	" 0.5 D	" 0.75 D
18	" 0.5 D	Myopia 1.25 D
19	" 1 D	Hypermetropia 0.5 D
21	" 0.5 D	Emmetropia.

Remarks.—The case changing from hypermetropia to myopia was tested with the mirror at each examination, the first one showing apparent emmetropia. He claimed, however, that his vision, which was above the normal standard, being $\frac{6}{5}$, remained quite as sharp and clear when the convex glass was interposed.

In the second case in which the hypermetropia diminished, each examination was made both by glasses and mirror, the results being the same.

MYOPIA.

There were at entrance 90 cases; of these 32 remained stationary, 58 increased in amount, namely:

By 0.25 D....	8	By 1.75 D....	2
" 0.5 D.....	20	" 2 D.....	2
" 0.75 D....	7	" 2.25 D....	2
" 1 D.....	8	" 2.5 D.....	1
" 1.25 D....	2		—
" 1.5 D.....	6		58

Average myopia at entrance..... 1.8 D (1.786).
Average myopia at graduation (the same students being taken)..... 2.4 D (2.436).
Average increase of myopia ..... 0.6 D

The following table gives an analysis of the cases in which the myopia increased, together with such scanty information with regard to the industry, health, or habits of the individuals as I was able to obtain from instructors.

II.—*Table of Changes in Myopia during the Four Years.*

Entrance age.	Original myopia.	Amount of increase.	Remarks.
18.	0.5 D	0.25 D	Very studious and capable.
24..	1.5 D	"	Dull student, but faithful and hard working.
15..	1 D	"	Very poor student.
17..	1.5 D	"	Second scholar in the class.
18..	0.5 D	"	Average man.
21..	3.25 D	"	Poor scholar.
20..	0.5 D	"	Very close student.
19..	0.75 D	"	Faithful worker.
20..	1 D	0.5 D	Faithful, plodding student; average ability.
22..	0.75 D	"	Very hard worker; ordinary scholar.
20..	0.75 D	"	Average student.
17..	1.25 D	"	Very good worker and scholar.
19..	0.5 D	"	Ordinary scholar; quite an athlete.
24..	1 D	"	Dull student; hard worker.
24..	0.5 D	"	Poor health; good scholar.
18..	1.25 D	"	A close student, not physically strong.
18..	0.5 D	"	Superior scholar.
21..	5.5 D	"	Poor scholar.
18..	2.5 D	"	Faithful student.
21..	0.75 D	"	Excellent and hard student.
16..	0.75 D	"	Hard worker.
19..	0.5 D	"	Very faithful worker.
18..	1 D	"	Not a close student.
18..	1.25 D	"	Not a close student.
17..	1.75 D	"	Average man.
19..	1.75 D	"	Very faithful in work.
18..	4.5 D	"	Very faithful.
18..	4 D	"	Very faithful.
17..	1.5 D	0.75 D	Very good scholar and student.
19..	1.5 D	"	Hard student.
19..	0.75 D	"	Physically weak; ailing continually.
18..	2 D	"	Faithful student.
17..	1.75 D	"	Works hard on German.
19..	0.75 D	"	Very faithful.

Table of Changes in Myopia.—Continued.

Entrance age.	Original myopia.	Amount of increase.	Remarks.
20..	0.5 D	"	Faithful.
21..	2.5 D	1 D	Good student; constant.
20..	7 D	"	Average man; hard worker.
20..	1.5 D	"	Very hard worker, especially in German.
16..	2.5 D	"	Excellent scholar.
17..	5 D	"	Faithful and successful scholar; takes but little exercise.
18..	1.25 D	"	Not strong; a close student.
19..	2 D	"	Very faithful.
17..	4 D	"	Very close student.
17..	0.75 D	1.25 D	Healthy, lazy; poor scholar.
18..	2.25 D	"	First scholar in his class.
20..	1.25 D	1.5 D	Very hard worker.
16..	0.75 D	"	Excellent scholar.
18..	2 D	"	Faithful student.
17..	2.5 D	"	Eyes very troublesome, preventing much study.
18..	2.5 D	"	Faithful student.
19..	0.75 D	"	Hard worker.
16..	0.75 D	1.75 D	Excellent scholar.
17..	2.25 D	"	Very close student.
21..	1.5 D	2 D	Good, constant student.
17..	1 D	2 D	Very faithful student.
15..	1.75 D	2.25 D	Extremely negligent.
18..	1.25 D	"	Faithful student.
17..	1 D	2.5 D	Very faithful student.

EMMETROPIA.

While the preceding table shows no greater change than was perhaps to be expected in the refraction of the myopes examined, and is mainly of interest as affecting the views already advanced by American observers in regard to the limited percentage of myopia among the educated classes of the country, when compared with those of Germany, Switzerland, and Russia, the observations with regard to the cases of original emmetropia will be found to possess peculiar interest, their result somewhat militating against theories that have found general acceptance.

We find no less an authority than Donders writing as follows: "I have extremely rarely seen near-sightedness arise after the fifteenth, and never after the twentieth year, in eyes

which were previously normal."[1] "After the twentieth year," says Mauthner, "the development of regular myopia is scarcely to be expected."[2]

Erismann also claims that, "after the sixteenth year, an eye that has thus far remained hypermetropic or emmetropic seldom develops myopia."[3] And Loring says it cannot be doubted that these statements are in the main correct, and in accordance with the experience of every observing oculist. His own opinion is given as follows: "After the eighteenth, or even sixteenth year, when the investing membrane of the eye has become firm and unyielding, over-study may produce other and graver diseases of the eye, but it will not produce near-sightedness."[4] Finally, Arlt observes: "The growth of the eye is wholly or nearly completed at the time of puberty, certainly by the twentieth year. The form of an eye, emmetropic or hypermetropic, at this period, remains nearly or wholly unchanged up to old age."[5]

It will be seen, however, that the above statements are contradicted by the following figures:

There were at entrance 125 cases of emmetropia. Of these, 86 (68.8 per cent.) remained emmetropic; 10 (8 per cent.) developed hypermetropia; 29 (23.2 per cent.) developed myopia. The average age of those thus developing myopia

[1] Accommodation and Refraction of the Eye, p. 348. 1864.

[2] Vorlesungen über die optischen Fehler des Auges, s. 491.

[3] A. f. O., Bd. xvii., Abth. 1, s. 14.

[4] Is the Human Eye Changing its Form under the Influence of Modern Education, p. 22.

I find that the above does not fairly represent Dr. Loring's views on this point, but is intended to simply state the general rule. That he admits exceptions is evident from the following, written two years earlier: "Clinical experience would point to such a conclusion, for it is a fact that cases occur where myopia with all its characteristic signs is produced in eyes which were previously normal; that is, in the eyes of adults, who have passed therefore the period of development, and whose family history shows no hereditary tendency. This, too, notwithstanding Donders's (21) assertion that he has never seen 'myopia arise after the twentieth year in eyes which were previously normal.' I have seen several such cases, and I doubt not that most practising ophthalmologists have had the same experience."—Progressive Myopia, p. 8.

He evidently, however, considers such cases more exceptional than my experience would seem to indicate.

[5] Über die Ursachen und die Entstehung der Kurzsichtigkeit, s. 29. 1876.

was very nearly nineteen (18.76) at entrance, twenty-three at graduation.

In	4	cases	myopia	0.5 D resulted.
"	13	"	"	0.75 D "
"	3	"	"	1 D "
"	3	"	"	1.25 D "
"	3	"	"	1.5 D "
"	2	"	"	1.75 D "
"	1	"	"	2 D "

The average myopia developed thus amounted to nearly 1 D (0.982).

III.—*Table of Change from Emmetropia to Myopia during the Four Years.*

Entrance age.	Amount of myopia developed.	Remarks.
20	0.5 D	Weak intellect, but faithful worker.
19	"	Average student.
19	"	Very good and close student.
18	"	Superior physically and intellectually.
21	0.75 D	Bright scholar; good gymnast.
18	"	An average student in all respects.
18	"	Delicate health; good scholar.
17	"	Superior scholar.
18	"	Average man.
17	"	Average in all things.
21	"	Very lazy.
18	"	Poor physique; neglects exercise.
17	"	First-class worker.
19	"	Very faithful scholar.
17	"	Very close student.
22	"	Hard student.
20	"	Hard worker.
16	1 D	Hard worker; studied very hard to his own injury.
19	"	Hard worker.
20	"	Hard worker.
16	1.25 D	Hard worker; abused himself by over-study.
20	"	Very hard worker; slow intellect.
23	"	Very hard student.
18	1.5 D	Uncertain health; good student.
18	"	Very hard student.
18	"	Acquires easily, but not hard student.
17	1.75 D	Very close student.
22	"	Hard student.
18	2 D	Faithful.

As has already been admitted, any generalization from these results may well be objected to on the ground that the number of individuals examined was comparatively limited. On the other hand the cases have all been followed up with extreme care, for an unusually long period, and are collected among subjects whose age was unusually advanced. They will at least avail as an instalment of that fund of statistics on which our knowledge of the influence of age and education on refraction is to be founded, a knowledge which as yet rests on a basis in part theoretical.

So far as these figures go they tend to show, first: the large amount of myopia, even in this country, among the educated classes. Dr. Loring's combined table of observations,[1] made on the eyes of scholars up to the age of 21, in various countries, gives the German percentage of myopia as 62.10, the Russians 42.8, and the American 26.79. My own investigations gave me, among 443 freshmen at Harvard and Amherst, a myopic percentage of 34; at graduation, at Amherst a percentage of 47.2. It is difficult, however, to compare Dr. Loring's figures with my own, as his statistics were based on observations, made between the ages of 6 and 21, and mine between 18 and 23. But all researches, made at this latter age, go to prove that at least, or very nearly, one-half of the educated community is myopic, in this as well as other countries.

Moreover, contrary to the impression so long entertained, myopia may be acquired at, or near, the twentieth year, from the same causes that produce it at an earlier age, and may continue to progress until the course of study is completed.

REMARKS.

DR. WEBSTER asked if Dr. Derby thought the students were originally hypermetropic and became myopic, in other words, does he believe that the antero-posterior diameter of the eyeballs in those cases actually become longer.

DR. STANDISH said he could only answer by saying that the examinations were made by glasses, and in all doubtful

[1] Are Progressive Myopia and Conus due to Hereditary Disposition, p. 10. Philadelphia, 1877.

cases the eyes were examined by the ophthalmoscope. He presumed that there was no manifest hypermetropia under ophthalmoscopic examination.

DR. WEBSTER would like to know if the emmetropic eye ever becomes hypermetropic from over-use; that is, does it actually change its diameter. He could not understand how an emmetropic eye can become hypermetropic through changes in the refractive media.

DR. SEELY asked if Dr. Derby had taken into consideration apparent myopia, and said the statistics given would not be so conclusive had this not been considered; another question, that with regard to the appearance of the eyes, diseases of the eyeball, etc., as indications of refraction.

DR. STANDISH said there were no statistics upon these points.

DR. GRUENING said he wished to make an observation, not so much concerning the subject under consideration in the paper as upon a term used by the author. Dr. Derby used the term Dioptric. We have now three different terms by which measurements are designated, dioptric, dioptrie, and dioptre. He thought we should reach some conclusion with regard to the proper term to be employed. English writers use the term dioptric, and this has been endorsed by Americans. Dr. Gruening thought it preferable to either the term dioptrie or dioptre. The word dioptrie he regarded as the worst that could be used. He would like to have the matter settled if possible, so as to establish a definite term.

DR. CARMALT could not regard the statistics presented by the paper as of any value. On the contrary, he thought them liable to lead to false conclusions if they were accepted. Living in a university town, and being called upon frequently to examine the refraction of students during "term time," he had found such examinations without artificial paralysis of A. quite uncertain. A moderate degree of spasm of A. was almost the rule among the *hard* students at the latter end of the term. He has almost every year been requested by students to give them glasses for (a manifest) near-sightedness, acquired, as they thought, within the previous few months. In a large number of these cases the instillation of atropia had reduced the M. to Em., sometimes to slight, and exceptionally to high degrees of H. In other cases apparent M. had been quite eliminated by a few days more or less of rest with soothing applications to the eyes—so that he had learned to distrust all cases of M. of moderate degrees, or of asserted increase in pre-existing M. until atropia had been instilled.

The claim that the ophthalmoscopic determination of the refraction removed any possible source of error in the examination by types and glasses was even more questionable. If a person, a student habitually makes an effort of his A. as in Hm. this is *not* relieved by simply placing him in a dark room for ophthalmoscopic examination and bidding him to look at vacancy; on the contrary, Dr. Carmalt believed that *usually* the spasm is increased, certainly it not infrequently is so, by throwing the light into the eye, the contraction of the pupil of course to some degree aiding (or exciting) the ciliary muscle in the movement. The fact that the observer was able to relax his own A. does not imply that the patient does also or is even able to if he knew what was desired of him, and until he does this his refraction for ophthalmoscopic examination is exactly what he makes it by the action of the ciliary muscle, and this may be either contracted or relaxed according to circumstances not under the control of the observer.

Dr. Carmalt was sorry that Dr. Derby was not present to take part in the discussion, as he could undoubtedly make some points in the paper clear that now seemed doubtful, but as it was to be printed as read, it did not seem advisable to have it published without calling attention to the possible sources of error.

DR. LITTLE thought that in making such examinations the general condition of the student should be taken into consideration, as for instance, it was well known that the refraction after typhoid fever and after diphtheria showed variations from the condition observed in health.

DR. HUTCHINSON asked if Dr. Derby had ordered special glasses, and also if there was any effort made to prevent an increase in the refractive error.

DR. STANDISH said he was unable to answer the question positively but he thought that no glasses were ordered.

[Being unexpectedly prevented from presenting the foregoing paper in person, and hence from answering any of the questions or objections brought forward during the discussion, in which my absence was regretted, I now take the opportunity of briefly alluding to them.

Both of Dr. Webster's questions are answered by Dr. E. G. Loring, in "Progressive Myopia and Conus," p. 11, Philadelphia, 1877. He says: "If a hypermetropic eye can become emmetropic by increasing its refraction, it would be

absurd to deny that it could not, by a little further increase, become myopic." And again: "The slight increase in the hypermetropia may be explained by a small amount of latent H. becoming manifest as the age advanced."

With regard to Dr. Carmalt's somewhat sweeping criticism on the value of my statistics, I would state that the usual pains were taken to avoid recent accommodative spasm as a source of error. I fully recognize the possibility of its occurrence among students, although I am bound to bear witness to its greater rarity in the latitude of Harvard than in that of Yale. Without being able to state positively that I asked the question in each individual case, the impression left on my mind is that these students generally testified to noticing a gradual falling off, during the college course, in their acuteness of vision for distant objects. My investigations were not made at times when the classes had been through periods of unusually hard work.

I make no claim that the ophthalmoscopic examinations remove any possible source of error, being more inclined than formerly to admit the justice of the view that there are cases of spasm and faults of refraction not to be penetrated by the aid of the mirror. It must surely, however, be allowed that the ophthalmoscope often discloses the true state of refraction, and that its employment in a doubtful case—while not insuring a perfect diagnosis—tends to eliminate a possible source of error. The desirability of making all examinations of this kind under atropine is evident; the practical difficulties in the way of its employment are, however, as in the present series, occasionally insuperable. And I cannot admit that its non-use nullifies our results.—H. D., January, 1884.]

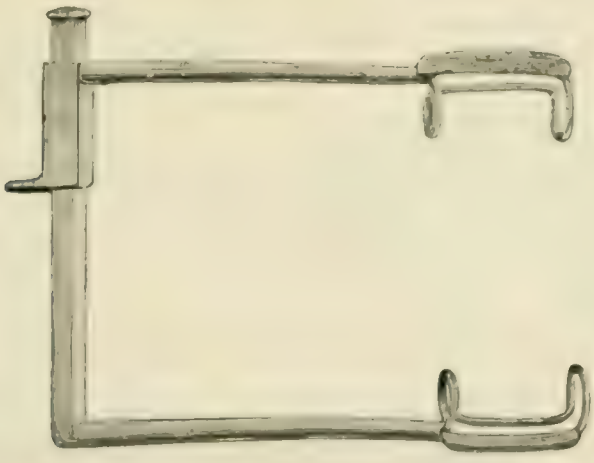
SOME IMPROVEMENTS IN INSTRUMENTS AND APPLIANCES FOR CATARACT OPERATIONS.

(With Woodcuts.)

BY RUSSELL MURDOCH, M.D.,
BALTIMORE, MD.

IN July, 1874, I showed to this Society an eye speculum and an ophthalmostat, or self-holding eye forceps, and have with me, though modified, the same instruments.

Speculum.—One blade of the speculum has attached at



right angles to it a bar, and the other in like manner a closely fitting canula. At the end of the bar is a button, which forms a shoulder that prevents the canula from slipping off, and on the side of the canula is a finger-rest, which is a handle to slide the canula on the bar. The blades are opened by approximating the button and finger-rest, and closed by reversing the action. The distinguishing features, therefore, of this speculum are the absence of spring and set screw. In this the lids themselves lock the instrument. The blades are long

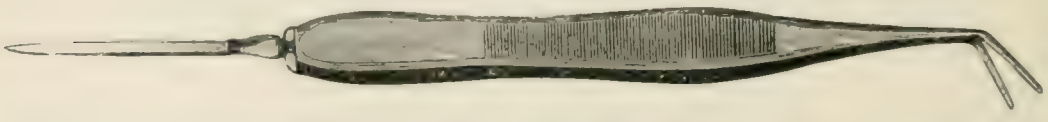
arms of mutually opposed levers, and are at right angles to their short arms—the bar and encircling canula. When the lids press the long arms together, the short ones would separate, but are prevented by the extended bearing and the close fitting of the canula on the bar. The least interruption of their parallelism suffices, as well as the greatest possible pressure to completely lock them, and on the other hand, power applied in a parallel direction to their short arms, as by button and finger-rest, unlock and at the same time slide them on each other.

Ophthalmostat.—My former ophthalmostat is in this so changed in direction as to seize the conjunctiva in a vertical

fold, and also by means of a rectangular bend of the blades, to rotate the eyeball without dragging it. Another change is substituting for the three little hooks, one broad sliding support.

Besides these modifications of my old instruments, I have two combinations, one of Graefe's knife, end to end with Wecker's scissors, and another of iris forceps with cystotome and shell spoon.

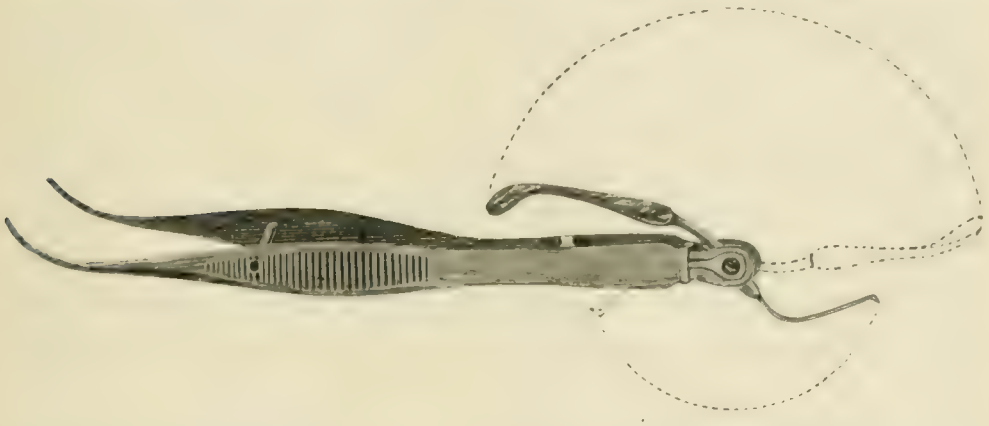
Knife and Scissors Combination.—In the first the scissors



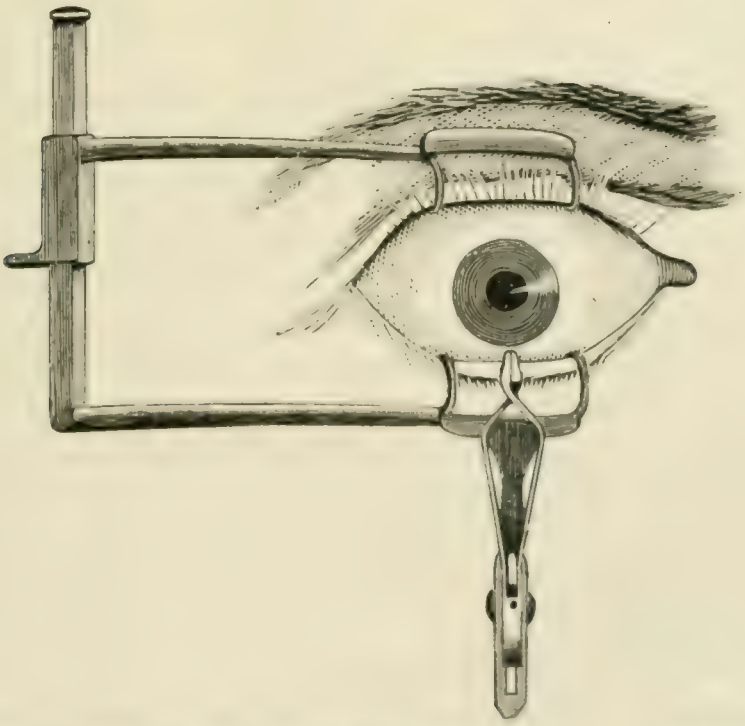
form a convenient handle to the knife, and in the second the iris forceps an equally good one to the other two instruments.

Iris Forceps with Cystotome and Shell Spoon.—This latter combination of three in one is rendered possible by extending upward the blades, uniting the cystotome and spoon end to end, and where joined, pivoting them between the extended blades of the forceps.

Advantages.—Counting as one the speculum and ophthalmostat, which they become in fact as soon as united, seven instruments are reduced to three in performing the modified

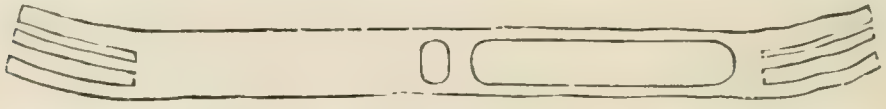


linear extraction of cataract; also an assistant skilled in the manipulation about the eye is dispensed with. My assistant devotes himself exclusively to the administration of an anæsthetic.



Modified Linear Extraction of Cataract.—The above-mentioned operation, as I have performed it for over ten years, is as follows: The speculum is introduced with closed blades; it

is then opened sufficiently wide to attach the ophthalmostat, first to the eye and then to the bridge on the speculum. The knife is taken in the right hand and iris forceps in the left. The latter can, if desired, reinforce the ophthalmostat and guide the eye while the section of the cornea is being made. After this, the knife and scissors combination is rotated by the thumb and fingers of the same hand, and, with the scissors, the iris is cut as soon as it is exposed by the forceps. Then the scissors and knife are laid down, and the iris forceps are passed from the left to the right hand. This passing from one hand to the other will, of itself, rotate the forceps, so that they point up the arm while the cystotome comes into its proper place, and is in readiness for the capsulotomy. Finally the spoon is revolved around the pivot in the place of the cystotome, and is held there by a catch while delivering the lens. It is important to remember that the left hand is



free either to loose the ophthalmostat and speculum, or to make the revolution of the cystotome and spoon, after the forceps combination is passed to the other hand, and that prior to this accidents which require prompt closure of the lids are infrequent. It is also to be noticed that the operator need never lift his eyes from the eye of the patient, nor lose time unnecessarily between the steps of the operation.

Bandage.—I have also with me a quickly made and easily applied flannel bandage. It is seven-eighths of a yard long, including strings, and three inches broad. To make it, the head is first encircled, and then from the surplus ends six equal half-inch broad strings, and from one-half of the bandage two oval openings are cut for the ear next to the operated eye and the back of the head. The uncut half passes across the eyes, and is tied at the side of the head. If pressure should be uncomfortable over the nose, the flannel may be notched. In dressing the eyes, the front only is lifted, as the ears and the back of the head hold the other half. I avail myself of this, and

half apply the bandage before commencing to operate, so as to, if occasion calls for it, apply the front half.

This binocular is converted into a monocular bandage by cutting pieces from the flannel where indicated by the interrupted lines in the drawing.

REMARKS.

DR. GRUENING, of New York, said that those who practise within the limits of civilization do not require so much multum in parvo. He said these complicated instruments should be discarded entirely, as they were very liable to get out of order, as had already been demonstrated by the instrument presented, which had become so disordered that the inventor was unable to use it himself.

With regard to the bandage, he thought the ordinary roller bandage could not be replaced by anything which has yet been brought forward. No bandage can produce the pressure that can be obtained by the use of the flannel bandage. It is necessary to immobilize the eye after a cataract extraction, and this cannot be done by any substitute for this bandage.

THE PRESIDENT said that he had had some experience concerning the use of the little forceps for fixation, and long ago he gave up the scheme, chiefly because it does not give so much control as one might imagine. He had also found that there was a liability to tear the conjunctiva in opening the eye with the speculum that had such an attachment to it. Again, the line of traction was not exactly what was desirable, and, besides, the operator had no ability to follow the eye and keep the whole hand in complete consonance with its movements. With the forceps in one's own hand, the operator can keep the hand in harmony with the movements of the eyeball, and make the pressure or traction correspond with the behavior of the eye. Under anæsthetics, this objection is overcome to some extent, although not entirely; and he had reached the conclusion that the operator's own hand should be used in the operation. Where an assistant can be obtained, he preferred to use the forceps himself.

DR. THEOBALD, of Baltimore, said that Dr. Gruening, in speaking of the bandage, had stated that with the flannel roller the eye could be entirely immobilized. He thought, however, that this was a mistake; that it was impossible, after a delicate operation, such as iridectomy or cataract extraction, to immobilize the eye with any form of bandage, because the amount of pressure required to do this was in-

admissible under such circumstances. The long flannel roller he considered especially objectionable in hot weather.

DR. GRUENING said he would not insist upon the flannel bandage, but would insist upon the long bandage. He had of late used a gauze bandage, dipping it into water before applying it, and had found that it makes a very firm bandage. As to whether the eye can be immobilized by the roller bandage, he wished to state that it can be when the bandage is properly applied, but if improperly applied it cannot be immobilized. If applied over the eye simply, it will make pressure upon the most prominent point, perhaps upon the bridge of the nose or upon the brow, and beneath it the eyeball has abundant opportunity to move. Therefore, the first thing to be done is to fill up the depression, so that when the hand is laid over the orbit, the brow and the bridge of the nose are not felt, and the hand rests upon the pad; now, if upon that pad pressure is made with the roller bandage, immobilization of the eye can be secured.

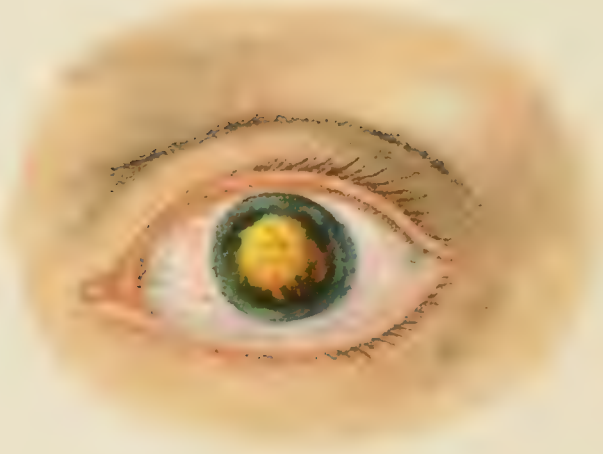
DR. THEOBALD thought that if Dr. Gruening would apply the bandage to his own eyes in the manner described, he would find that the eyeball is not immobilized.

A CASE OF TUBERCLE OF THE IRIS.

(With Chromo-Lithograph.)

BY H. S. SCHELL, M.D.,
PHILADELPHIA, PA.

THE patient, a schoolboy, nine years of age, applied for treatment at Wills' Eye Hospital on August 29, 1881. The left eye had then been painful for four days. The iris was bound down everywhere by posterior synechiæ and the pupil would not dilate under atropia. The eye exhibited the usual signs of ordinary plastic iritis. The inunction of mercurial ointment and free local use of atropia were prescribed. When seen again, on September 16th, this treatment had produced no effect, but was continued for a few days longer, with the addition of small doses of calomel and opium. The boy was not seen again until he appeared in the wards of the Children's Hospital, in the latter part of October, suffering from well-marked symptoms of coxalgia in the second stage. It transpired then that there was a distinct history of phthisis on



the mother's side, that the boy had never been healthy and that the pain in the hip had been first noticed in July. Under the care of Dr. Ashhurst the usual treatment of local blistering and an extension apparatus were applied. The left eye being still a cause of complaint my attention was invited to the case. I found the eye still somewhat painful. There was a ring of circumcorneal injection, the pupil was immovable, the fibres of the iris atrophied, and projecting from the nasal side of the pupillary margin was a small yellowish-white nodule, the size of a pin's head and tinged with pink. This nodule gradually increased in size. Vision was completely lost in December, and in May, 1882, the anterior chamber was nearly filled with the new growth. The nodule was of a yellowish tinge and a few minute blood-vessels could be seen upon its surface. At this time the intraocular tension was increased and the eye was tender on pressure but not otherwise painful. The accompanying drawing represents the external appearances quite accurately. In the meantime an abscess had formed on the outer side of the thigh. It was now aspirated by Dr. Ashhurst and twenty-four ounces of pus withdrawn. The abscess rapidly refilled and opened spontaneously at the point of puncture a week later. A diagnosis of tubercle of the iris was made and on May 30th I enucleated the eye with the hope of preventing the extension of disease. Healing progressed without obvious incident. The discharge from the thigh gradually decreased, ceased in July, and the boy was discharged from the hospital in September with very good movement of the hip and but slight shortening.

The excised eye was placed in Müller's fluid and a microscopical section subsequently examined by Dr. Geo. B. Laurason, of New Orleans. He reports that the specimen shows two or three tubercular masses imbedded in a mass of organized inflammatory product. There is one small round tubercle in the left ciliary region and in front of the iris an oblong tubercular mass is seen, containing three or four plugged-up blood-vessels. The tubercles seem to have developed in the organized inflammatory product, which nearly fills the anterior and posterior chambers.

REMARKS.

THE PRESIDENT remarked that within the last year a case had come under observation in New York which presented certain remarkable difficulties in diagnosis. The patient was four years of age. The gross appearances were such as to make it impossible to distinguish between a gliomatous condition and a metastatic choroiditis. The case continued under observation several weeks without much progress. Finally the eye was enucleated, and on examination it was found that tubercular disease was the true nature of the lesion. At that time it was felt by those who saw the case to be impossible to make a satisfactory differential diagnosis between tubercular disease and the gliomatous condition.

A CASE OF TUBERCULOSIS OF THE CILIARY BODY AND IRIS.

BY O. F. WADSWORTH, M.D.,
BOSTON, MASS.

MARY MCG——, aged three and a half, was sent to me by Dr. H. Derby for consultation, on October 24th, 1882. Dr. Derby wrote: "I first saw this eye October 4th. The process had then lasted two weeks. It seemed to be a keratoiritis, as well as I could make out. The pupil was small, and remained so in spite of atropine. The cornea was hazy. Atropine, shade, fomentations, oleum morrhuæ, have been used. The eye has grown steadily worse and pain more frequent. October 10th the yellowish reflex from the pupil was first visible. Since then it has become more pronounced, and the pupil has enlarged. I have seen no vessels, but perhaps have not looked as closely as I might."

The question was as to glioma or irido-choroiditis.

The father stated that both he and the mother were in good health; that there were two children older and two younger than this one, the oldest seven years, all well, "never a doctor in the house with any of them." These statements as to

the health of the family were found later to be quite incorrect.

The child's mother had noticed redness of the left eye five or six weeks before; after a few days the child complained of light, and a handkerchief was tied over the eye. The mother said that, except when the eye was looked at or drops put in, there had been no complaint of pain till the last day or two, and then not much; that the child slept well and played about all day with a bandage over the affected eye.

I found, as had Dr. Derby, that it was very difficult to obtain a view of the eye. Even when the patient was held and the lids forcibly opened, the rolling up of the eye and the great flow of tears prevented a satisfactory inspection. The lids were natural; the cornea hazy; the conjunctiva of the bulb moderately congested, but no very marked ciliary congestion; the anterior chamber of good depth; pupil moderately dilated; the upper portion of the iris apparently thickly set with vessels; a yellowish reflex from the pupil.

My diagnosis wavered between glioma and irido-choroiditis, and I suggested to Dr. Derby the advisability of an examination under ether before advising enucleation.

Two days later, October 26th, Dr. Derby etherized the child, and found much vascularity of the upper part of the iris, but no trace of vessels in the yellow mass in the pupil.

November 15th, Dr. Derby examined again under ether, found the disease much advanced, and advised enucleation. On the following day I also examined under ether. There was considerable circumcorneal congestion. Above was a staphyloma in the ciliary region, generally dark in color, perhaps 5‴ by 3‴. No trace of iris was visible, but a growth reached forward everywhere nearly to the cornea, its surface yellowish-white and showing numerous vessels and some hemorrhages. Some vessels also extended into the cornea from its periphery.

Both Dr. Derby and I believed the growth to be a glioma. The eye was enucleated the same day by Dr. Derby, placed in Müller's fluid, and given to me for examination.

Some weeks later the eye was divided through the centre of the staphyloma, nearly in the vertical meridian. The retina and choroid lay everywhere in contact with the sclera. The greater part of the vitreous chamber was occupied by a thin serous fluid. A solid grayish mass filled the anterior part of the globe. The posterior surface of this mass, irregularly concave, extended across the globe from a little behind the ciliary body—from a point 8 mm. from the cornea below to a point 10 to 11 mm. from the cornea above. It was about 6 mm. thick in the centre. From the most prominent part of the staphyloma, which projected about 3 mm., it measured 7 to 8 mm. in thickness. Something more than the anterior half of the thickness of the mass, starting from a point 2 to 3 mm. behind the cornea below and extending upward to a little behind the posterior border of the staphyloma above, was in appearance denser and of a duller, somewhat darker tint than the rest. It was partly and irregularly divided from the posterior portion of the mass by a broken dark line, apparently the remains of the iris. The posterior part of the mass was of a lighter tint of gray and less dense, seeming somewhat fibrous and like condensed and altered vitreous. Behind the edges of the mass the retina, and the choroid so far as it could be seen, appeared normal. There was no sign of the lens.

Microscopic examination showed the greater part of the solid mass to be mainly made up of granulation tissue, varying in different parts, here containing closely packed small cells, there mostly consisting of fibres running approximately parallel. The latter were most numerous at and near the anterior border, and now and again broad bundles of the fibres curved forward to the posterior surface of the cornea. Through the mass ran large vessels, and there were remains of many hemorrhages. The pigment, irregularly scattered, was for the most part all that could be made out as remainder of the normal tissues of iris or ciliary body. Throughout this tissue, except in the more fibrous portions, were scattered rounded agglomerations of cells, more deeply stained by hæmatoxylin, and showing the characteristic cell forms and

arrangement of tubercle ; giant cells, containing many nuclei, surrounded by epithelioid and small granulation cells.

The posterior layer of the mass was much more free from cells, and appeared to consist of the infiltrated and thickened remains of the vitreous. In this was seen also, in the sections, the collapsed and folded lens capsule, lined here and there for a short distance by what seemed to be its degenerated epithelium, and containing apparently some débris of lens fibres.

One-half of the globe was given to Dr. H. C. Ernst, then engaged in the investigation of the bacillus of Koch, and, although the fact that the eye had been in Müller's fluid made the search more difficult, he was able to demonstrate satisfactorily the presence of the bacillus in the specimen.

Until the result of the microscopic examination was reached there had been no suspicion of the tuberculous nature of the disease. This was the first case of the kind either Dr. Derby or I had seen, and the family history, as given by the parents, gave no indication that such disease was at all likely. Indeed, looking back now, with the knowledge of the true nature of the case before me, I um unable to recognize anything in the visible appearances of the growth when I saw it, or in the history of its course, by which it could be distinguished from a glioma, unless, perhaps, the great vascularity of the iris which preceded the development of the growth into the anterior chamber may be regarded as of some value for the differential diagnosis.

The statement that the child herself and the whole family had been free from anything pointing to tubercle made the case one of much interest to follow. The child continued in apparently good health for more than five months after the enucleation ; then for five or six weeks she complained of headache, not enough to lead the parents to call a physician ; suddenly became worse, and Dr. Ferguson, who was called, found her in convulsions. She died three days later with the diagnosis by Dr. Ferguson of tubercular meningitis. There was no autopsy.

It was only some time after her death that I learned from

Dr. Ferguson that he had attended the family for several years, that the child's father and a brother of the father had phthisis, and that the children had been subject to bronchial attacks.

REMARKS.

DR. PROUT asked if there was increase of tension.

DR. WADSWORTH replied that it was impossible to test tension until the patient was under ether, and at that time the entire anterior chamber was filled with the growth.

DR. PROUT said that he asked because he had had a case in which the tension was extreme, occurring in a boy six years of age, whose eye gave a whitish reflex through a small and unyielding pupil. The intra-ocular pressure was so great that the sclera was beginning to yield in the superior ciliary region. The media were not clear, and there was doubt as to whether the reflex was caused by a tumor or by exudative cyclitis or choroiditis. As the local condition seemed to impair his general health, the eyeball was enucleated and is now in the hands of Dr. C. S. Bull for microscopical examination, who has not yet had time to make a report.

DR. WEBSTER had a case under observation of supposed tubercular disease of both irides, occurring in the person of a farmer, thirty-five years of age, who when he first came under observation presented all the appearances of syphilitic iritis. There was three or four tolerably large nodules upon one iris and something of the same appearance on the other. He put him under treatment by mercurial inunction followed by the iodide of potassium, but without improvement, at the same time using atropine faithfully. The man grew worse and worse, and finally Dr. Agnew performed iridectomy upon both eyes and the operation was subsequently repeated, and still later Dr. Agnew removed the lens from one eye. The patient had recurring attacks of inflammation, but finally was discharged from the Manhattan Eye and Ear Hospital with a slight amount of vision. The trouble was diagnosed as tubercular iritis, more from the fact that the man had evidence of tubercular disease in the lungs with undoubted history of consumption in the family; and that the ordinary treatment in such cases failed to arrest the process. The portion of the iris removed was examined by Dr. Prudden, who failed to find anything to make it certain that the disease was tubercular in character.

A PERSONAL EXPERIENCE WITH PRISMATIC GLASSES.

BY S. F. MC FARLAND, M.D.,
OXFORD, N. Y.

OPINIONS are so various in regard to the efficiency of prismatic glasses in correcting or alleviating the distressing annoyances resulting from muscular paresis, that a brief statement of a long personal experience in the use of them may perhaps be admissible.

During my boyhood, I had a slight divergence, occurring and disappearing at times. Although seldom sufficient to attract attention. Still I had the full use of my eyes, could judge of distances as well as others, and was even expert in many of the sports of youth requiring binocular vision. I had no inconvenience during my studies, always enjoying the greatest comfort during the most severe and protracted application.

During the autumn of 1862 I contracted a typho-malarial fever in the army, on recovering from which I found that I had lost the full and comfortable use of my eyes, which continued with the usual pain and annoyances attending a futile effort to use both eyes in conjunction, and I was compelled to discontinue reading almost entirely, until finally in January, 1866, I consulted Dr. H. D. Noyes.

He gave me plane prisms of 7° each, bases in, for distance, and 8° each with + 36 S. for reading. At this time I had been nearly three years unable to obtain binocular vision *even for a moment*, and when once more I saw the beautiful landscape spread out in its true perspective, I was delighted. I have never discontinued them. They have been varied from time to time, endeavoring to obtain the best results, but always adhering to the prisms.

You may ask if I suffer no inconvenience? I do. Very great inconvenience, and cannot maintain *continued* binocular vision, but I *can obtain*, and *retain* it long enough for an iridectomy or an extraction, and even during very protracted operations, although at the expense of pain and a distressing lassitude following the effort. Without the prisms I could not do those things, as slight differences in distance would not be appreciable. At present I wear bifocal sphero-prismatic glasses, with the division one-third the width from below, instead of in the middle, and at an angle of 15° below the horizontal, thus rendering the division as nearly invisible as possible when looking through the lower portion in reading. The only inconveniences noticed were chromatism and spherical aberration, both of which disappeared after wearing the glasses a few weeks.

I have been told by able ophthalmologists that prisms were of no use to me, that they did not afford me binocular vision, and might as well be dispensed with. But after an experience of seventeen and one-half years, I consider "half a loaf better than no bread," and propose to continue their use. You may say that patients do not accept them. Neither do they cylindric glasses in many instances, although they increase the sight many fold. Patients are more likely to recognize the inconveniences than the advantages of spectacles, and do not always appreciate changes of moderate degree.

When I commenced wearing prisms it required 14° to enable me to use both eyes in conjunction. I can now do so without any aid, the prisms seeming to encourage the interni rather than proving detrimental to their functions. With the bifocal sphero-prismatic glasses I am able to do all my office work without changing, and with a reasonable amount of comfort.

REMARKS.

DR. WEBSTER asked why not have the external rectus cut.

DR. McFARLAND said he had only proposed to consider the practicability of prismatic glasses.

DR. MCKAY had a case present itself to him in September, 1878, occurring in a music teacher who had double vision; he stood directly in front of his class, and without moving his head made extreme excursions with his eyes to the right and to the left, and in this way weakened the external recti. Dr. McKay ordered prisms with bases externally (for distance only), which the patient continues to wear with comfort. Dr. McKay further stated, that when he had his case under charge he had previously read and studied closely Dr. Noyes' paper on asthenopia with reference to the use of prismatic glasses, and found the observations very comforting and beneficial at that time.

ON THE APPARENT CURVATURE OF SURFACE PRODUCED BY PRISMS.

(*With Woodcuts.*)

BY O. F. WADSWORTH, M.D.,

BOSTON, MASS.

IT is a familiar phenomenon that a plane surface appears convex when looked at through prisms placed before the eyes with the bases inward, while the same surface appears concave if the prisms be arranged with the bases outward. The phenomenon may be explained as follows:

Let the curved lines R and L (Fig. 1) represent the retinas of the two eyes of an observer, k and k′ the nodal points of the eyes. Let the line C D E be parallel to a line which would connect the nodal points of the two eyes. Let C and E be points on this line from which perpendiculars to the line would pass through k and k′. Let D be equidistant from C and E. Further, let lines be drawn from C, D and E through k and k′ to meet the two retinas.

Now, suppose the eyes to be directed toward D. The image of D will fall upon the retina of each eye in the direction of the lines D k and D k′. The separation of the image of E from that of D on the right retina will be determined by the angle a = angle D k E; and the separation of the image of E from that of D on the left retina will be determined by

the angle a′ = angle D k′ E. In the same way the angles b = C k D and b′ = C k′ D will determine the separation of the images of C from those of D on the two retinas.

From the construction of the triangles D k E and C k D it is evident that the angle D k E = a is greater than the angle C k D = b. It is also evident that the angle C k′ D = b′ is greater than the angle D k′ E = a′. Therefore, the image of E in the right eye will fall on a point of the retina farther from the image of D than will be the case in the left eye. As to the image of C the reverse will be the case.

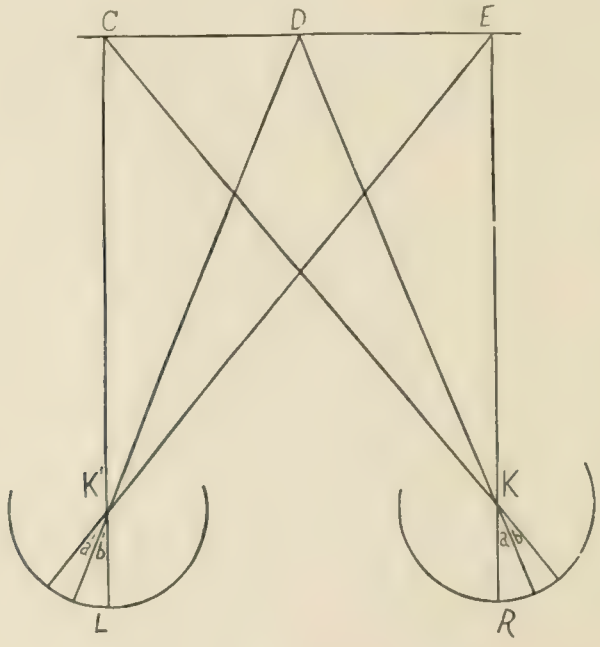


FIG. 1.

Moreover, the ratio between the angles a and b, between a′ and b′, and hence between the distances of the images of E and of C from that of D in each eye, is always the same, whatever may be the distance of the line C D E from the eyes. Thus, if the distance of this line from the eyes be doubled the angle D k E will be one-half as great; the angle C k E will also be one-half as great as before, and hence the angle C k D will be one-half its former size.

This is the condition with the unarmed eye.

If now, the position of the eyes and of the line C D E re-

maining the same, prisms with the bases inward be placed before the eyes, the rays of light coming from the points C, D and E are, on passing through the prisms, deflected toward the nose. But the rays coming from the different points are not deflected equally. The greater the angle of incidence of the ray the greater will be the deflection. Construction shows also that the increase in the angle of deflection is proportionally greater the greater is the angle of incidence. For instance, if three rays fall on a prism with angles of incidence respectively of 10°, 20°, and 30°, the difference in the amount

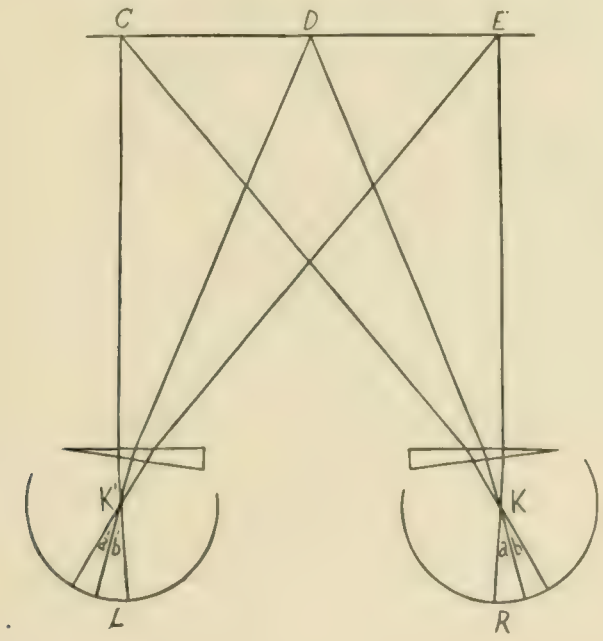


FIG. 2.

of deflection of the rays incident at 20° and at 30° will be greater than the difference in the amount of deflection of the rays incident at 10° and at 20°.

The effect of the prisms is, then, to change the angles which determine the amount of separation on the retinas of the images of C and E from those of D. These angles all become smaller. But not only do the angles become smaller under the influence of the prisms, there is also a change in the ratio of the angles to each other in each eye. Thus comparing Figs. 1 and 2, angle β does not bear the same relation

to angle α as angle b does to angle a, but is proportionally smaller. So α' is proportionally smaller than β' as compared with a′ and b′.

And this change in the ratio of the angles, or, in other words, of the proportionate separation of the images, is the cause of the appearance of convexity given by the prisms to the surface looked at. For precisely this change in the ratio of the angles occurs when we look at a convex instead of a plane surface.

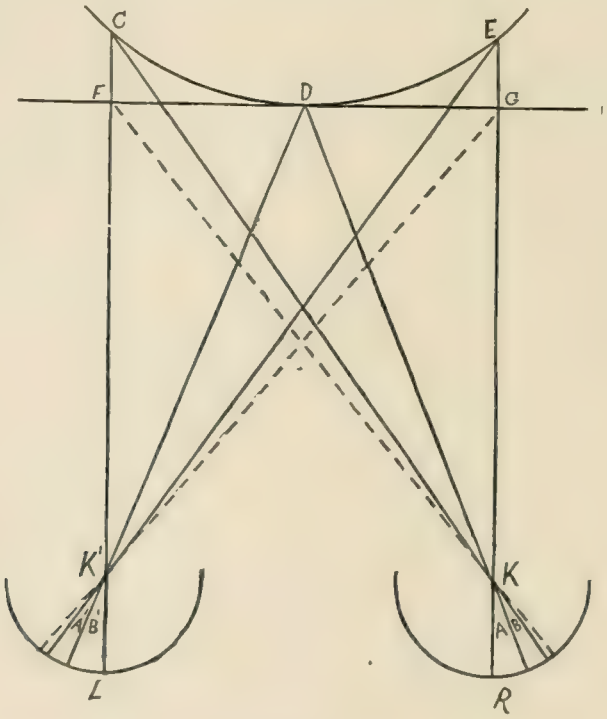


FIG. 3.

This will be readily seen from Fig. 3. Here the unarmed eyes look at the convex surface C D E, the distance of D from the eyes being the same as in the other figures. Angle D k E = A is evidently the same as angle D k E = a in Fig. 1. Angle F k D is evidently the same as angle C k D = b in Fig. 1, and, therefore, angle C k D = B in Fig. 3 is less than angle C k D = b in Fig. 1. We have then here angle B smaller in proportion to angle A than angle b is to angle a, just as, when prisms were used in looking at a plane surface, we found angle β smaller in proportion to angle α, than angle b is to

angle a. The same holds good, of course, as to angles A′ and B′.

So far, strictly speaking, it has only been demonstrated that a line in the surface looked at, running from side to side and situated in the visual plane, must appear convex when seen through the prisms.

The same reasoning, however, applies to all other lines of the surface which run parallel to the visual plane, and thus the whole surface should appear curved from side to side.

But the surface appears curved from above downward as well as from side to side. Suppose the surface to be perpendicular to the visual plane, and to be made up of a series of lines parallel to that plane. Each such line must appear convex forward, but its apparent convexity will be less and less the farther it is removed, upward or downward, from the visual plane. For the farther it is from this plane the greater will be its distance from the eyes, and the less will be the angle which the rays starting from its different points make with the prisms. Hence the deflection of the rays and the consequent change in the ratio of the angles which determine the separation of the images of its different points on the retinas will be less.

A CASE OF SYMPATHETIC NEURO-RETINITIS.

By JAMES A. SPALDING, M.D.,

PORTLAND, ME.

THE able works of Mauthner[1] and Knies[2] contain brief mention of nearly all those cases of sympathetic retinitis or neuro-retinitis which, up to the time of their publication (1879–1881), had appeared in various ophthalmological and medical journals. Mauthner analyzes several cases in his usual satisfactory manner, and comes to the conclusion that owing to the impossibility of obtaining a good view of the interior of the eye during the uveal inflammation, many more cases of retinitis are sympathetic than those in which clear and unmistakable evidence of the fact can be obtained. At the same time, he thinks that we should not forget to pay proper attention to the assertion made by Schnabel,[3] that the common form of iritis is frequently complicated with diffuse retinitis.[4] We shall not, then, be led astray by the simultaneous appearance of both retinitis and iritis in an eye after its fellow organ has been in any way injured. If Schnabel's observations and those of other oculists are correct, it is plain that most of the cases of assumed sympathetic

[1] Sympathetic Diseases of the Eye, pp. 86 et seq. English translation.

[2] Festschrift für Ehre, etc. Professor Horner: Ueber Sympathische Augenerkrankung. 1881.

[3] Knapp's Archives, vol. v., p. 154.

[4] Mr. C—— has been under my care at intervals during the last four years. In all, he has had eight attacks of iritis, two of the right eye and six of the left. During an attack of iritis in the left eye, six years ago, he contracted a broad adhesion, which may account for the frequent repetition of the disease in this eye. All of these attacks have been marked by diffuse retinitis in the most exquisite form. At the same time there have been changes in the field of vision, and considerable diminution of vision. This phenomenon has always been observed at a time when the iritis was retrograding.

retinitis or neuro-retinitis must be laid aside as not proven, or as carelessly observed and too hastily reported.

Knies (loc. cit., p. 63) evidently thinks that most of the so-called cases of "*sympathetic*" neuro-retinitis are widely open to criticism. The so-called rare forms of sympathetic disease are either accidental combinations (an affection of the one eye while the other was phthisical) or they are to be arrayed among those symptoms which merely indicate sympathetic irritation. This author mentions seventeen cases which were accessible to him in literary form, and asserts that in ten at least the neuritis was associated with choroiditis and cyclitis. In other words, the neuritis was simply a co-ordinate symptom of the common type of sympathetic irido-choroiditis, and terminated in precisely the same manner as the latter disease. In two other cases the data, according to Knies, were insufficient, in a third the sympathetic nature of the neuritis was far from being proved, while two others, which were not influenced in the least by the enucleation of the injured eye, yielded promptly to a course of inunction. Knies consequently concludes that sympathetic ophthalmia always appears in the form of plastic or serous irido-choroiditis.

In recent literature (1882-83) I find several cases of sympathetic ophthalmia, in which brief mention is made of retinitis or neuro-retinitis, but iritis or irido-choroiditis has always closed the scene.

These views of Mauthner and Knies especially are so diametrically opposed that it seems desirable to publish, and thus to offer to careful criticism, every case of apparent sympathetic inflammation of the retina and optic nerve (either alone or conjoined). Above all does this appear necessary when we have, as at present, to offer one in which, so far as accurate and repeated examinations have availed, the retina and optic papilla of one eye underwent inflammation after an injury to its mate, while at no time, from the beginning of the case, were there ever any visible signs of inflammation of any portion of the uveal tract.

Mrs. A—— is a Danish woman, about fifty-six years of age,

healthy in every respect. She has never had any trouble with her eyes previous to the accident which we are about to discuss. She has for some time worn convex 16 (+2.5 D) for reading, and with these glasses has been enabled to read, at the proper distance, the type in a Danish Testament corresponding in size with Snellen 1½. Although she cannot speak English, she is surrounded by a family of intelligent daughters, from whom as interpreters I have gathered her story. She recollects that both eyes used to be alike, for she had often in the past covered one eye at a time, so as to test each one separately, and found that she could see equally well with both. She has had several children, the youngest now about thirteen. She has never miscarried, and has never had any signs of syphilis. These points I have mentioned lest the neuro-retinitis, later observed, be attributed by some to latent or recently acquired syphilis.

On January 6, 1883, the patient, who lives in the country, a few miles from Portland, was about to milk a cow, when the animal, as so frequently happens, tossed up its head, hit the patient's right eye with one of the horns, and rendered it at once and forever totally blind. The patient saw a flash of light, and then the sight was gone. A physician was called, or at least was asked to give advice in the case. He directed the application of simple cold-water dressings. For some reason or other, whether owing to the distance at which the patient lived, or to the bad condition of the country roads, the physician did not see the injured eye at the time, so that we do not know its condition after the accident.

The patient dragged along several weeks with severe pain in the right forehead and temple, when, without warning, on the thirty-fifth day after the injury, the sight of the left eye began to be affected. Familiar objects about the house gradually grew dim, and by the end of a week or ten days, without any pain in this eye, the patient's vision diminished so extensively that she had to be led about. The same physician was again called, and, now alarmed by the reports of her children, he made a personal call upon the patient. He recognized the case as one of sympathetic ophthalmia, and has

since told me that the patient was at that time blind in both eyes. He had no ophthalmoscope, but, noticing as he thought, that the left pupil was small, he ordered a solution of atropia (0.12 to 32.00), which dilated the pupil to a moderate degree; *i.e.*, it was not dilated to its whole extent, but was round and did not appear to be adherent at any point of its circumference. The globe was not reddened in the least, nor was it painful. The sight was not at all improved by the use of the atropia, nor did it change at all during the following week. Finally, however, there came a change for the better; the mist before the patient's sight decreased in thickness, as she expressed herself, and she could slowly find her way about the house. The pain in the right side of the head was still very severe, and there was a great deal of sleeplessness. The case went on without any further substantial change for the better till March 28th, eleven weeks from the time of the injury to the right eye. At this time the patient, much reduced in her bodily health by loss of sleep and long-continued pain in the right eye and its neighborhood, and in great dread lest her sight should never be restored (although it was better than when at its worst) was brought to me for consultation.

Present State.—The patient is naturally a robust and healthy woman of fifty-six years, but is now much reduced in health by her long sufferings. She complains of pain in the right temple, and also of deep-seated pain in the right orbit. The right globe is atrophied, the cornea is invisible, its place being occupied by a long cicatrix extending diametrically across the former position of the cornea and infringing upon the ciliary region at both extremities. A band of connective tissue unites the globe to the upper eyelid. The latter also exhibits a cicatrix just as if it had been crushed by the cow's horn. The globe is very sensitive to the touch, but careful testing does not awaken a symmetrically sensitive spot in the other eyeball.

Left Eye.—The lids, conjunctiva, cornea, and anterior chamber are normal. The pupil is dilated to its maximum extent by the atropia solution, which had been used for the

last time about two days before. There is no trace of any adhesion upon the capsule of the lens; no remains of uveal pigment, as would probably have been the case had there ever been any iritis. The refractive media are transparent; there is no trace of vitreous opacities, even by using the strong convex glasses of the refracting ophthalmoscope. In the retina and optic papilla, however, we discover the typical appearances of neuro-retinitis. The edges of the disk are discolored, somewhat hazy, and raised above the level of the surrounding retina. Just at the margin of the disk the veins of the retina are enormously swollen and tortuous, the upper one rising considerably above the level of the disk in two or three corkscrew-like twists, just as we occasionally see them described in cases of neoplastic formation of vessels in the vitreous. The lower vein does not show this peculiarity. After leaving the papilla, both the arteries and the veins of the retina pass off in a congested and tortuous condition to about one-half the distance toward the periphery of the retina, where they then resume their natural appearance. The retina is likewise infiltrated over about the same region. I could not discover any change in the choroid coat. The patient is so apathetic from her bodily sufferings that it is impossible to discover the state of the field of vision. Refraction emmetropic. Vision (probably affected to some extent by the action of the atropia), fingers at three or four feet.

March 30th.—Contrary to the opinion expressed by Mauthner, who "would not like to enucleate in a case of sympathetic neuro-retinitis," the right eye was enucleated to relieve the pain from which the patient was suffering. The operation was followed by excessive hemorrhage, which could not be checked by pressure or hot water, and only ceased after ligature of one artery deep in the orbit, and of a second which appeared to spring from the band of connective-tissue uniting the globe and upper eyelid. The case now proceeded favorably, and the patient was sent home in ten days with the vacant orbit in a promising condition. Owing to my desire to see what influence the enucleation of

its fellow would have upon the better eye, I abstained from all medical treatment. The result appeared to justify my opinion of the truly sympathetic nature of the neuro-retinitis, for sight gradually returned to the remaining eye. The pain in the head disappeared with considerable rapidity.

July 14, 1883.—I saw the patient again, and examined her with the ophthalmoscope. Left eye normal; pupil active; media transparent; retina and optic papilla normal; the only abnormity consists in the presence of slight tortuosity of the same vein which was previously mentioned as projecting into the vitreous. Vision $\frac{20}{30}$, and Snellen $1\frac{1}{2}$ with ease, with convex 16 (2.5 D).

The right orbit still discharges a moderate amount of secretion. There is no sensitiveness to touch in the entire region.

I regret to report the loss of the enucleated eye. While cleaning my instruments after the operation, the eye, which had been carefully laid aside, with a warning to the people not to touch it, was swept away with the soiled cotton and sponges, thrown into a bucket, and dumped into the water-closet.

I am inclined to think that we should have discovered that the optic nerve had been directly crushed at the time of the injury by the cow's horn.

The presence of this neuro-retinitis with total loss of sight in an eye, five weeks after an injury to the other, and without any other visible or possible cause, such as idiopathic iritis, syphilis, cerebral lesion, etc., indicates the sympathetic nature of the disease. It is impossible to associate this condition with a sympathetic iritis which might have flourished during the interval of February 20th to March 28th, for such an inflammation would not have disappeared under the sole influence of so weak a solution of atropia, and that only occasionally employed. Nor would an iritis of so extensive development as to render the patient blind have disappeared under any treatment, in so short a period, without leaving its traces behind, in the form of adhesions, pigment on the capsule of the lens, or ciliary injection. Furthermore, the ab-

sence of all pain and injection in the left eye was emphasized by the patient and physician. May there not have been a serous iritis which would account for all this condition in the left eye? I think not; for according to my experience, this form of iritis never reduces vision to so low a degree, nor have I ever known its traces to disappear for months, even under the most favorable influences and active treatment at the hands of myself as well as of other more noted ophthalmic surgeons.

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HUGO MÜLLER: Peri-papillitis. Inaug. Dissertation, Greifswald.

HIRSCHBERG: Excessive Swelling of the Papilla in the Enucleated Eye. Arch. f. Ophth., vol. xxii., part 4, p. 136.

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The above are quoted from Knies, loc. cit., p. 62, note.

GALEZOWSKY: Neuro-retinitis after an Injury to the Other Eye. Receuil d'Ophthal., November, 1880.

NETTLESHIP: Sympathetic Ophthalmia after Enucleation of the Globe. (The sympathetic affection appeared as neuro-retinitis in four out of nine cases.) British Medical Journal, April 17, 1880.

BENSON (Ophthalmic Review, May, 1883) and W. C. AYRES (Knapp's Archives, vol. x., p. 294) both draw attention to the incipiency of sympathetic ophthalmia with symptoms of neuro-retinitis. It appears, however, that in their cases iritis, vitreous opacities, and irido-choroiditis supervened and destroyed vision.

LEBER (Centralblatt f. Augenheilk., 1882, p. 409) and BECKER (Ibid., p. 508) mention similar cases.

All other cases not herein directly quoted may be found in Mauthner (loc. cit., p. 86 et seq.).

REMARKS.

DR. WEBSTER said he had reported two cases of sympathetic neuro-retinitis where he enucleated the eye causing the sympathetic trouble, and with excellent results, the neuro-retinitis subsiding and the eye recovering with much better vision than it had before the operation was performed. He thought also that Mauthner is wrong in saying that enucleation should not be performed where there is serous iritis.

DR. PROUT said, in reference to hemorrhage in Dr. Spalding's case, that he had three times had troublesome hemorrhage after enucleation, which external pressure, cold (ice in the orbit), heat (by means of hot water externally applied) had failed to arrest, but which had been completely controlled by using the index finger as a tampon. He thought this much easier and safer than the use of a ligature could possibly be. His method is to pass the finger deeply into the orbit and to hold it there with pressure until the bleeding ceases. If on removal blood still flows the finger must be replaced, etc. The principal inconvenience is the delay, which in one case was of nearly two hours and a half duration, with considerable fatigue as a result. Its advantage over other methods is that when the hemorrhage is arrested there is nothing mechanical or chemical left in the orbit that the surgeon must remove, or that can interfere with the healing process and so impair the subsequent mobility of an artificial eye.

DR. MITTENDORF said that he had not had the slightest difficulty after enucleation since he had applied sponge pressure; he used it as a continuous dressing in these cases immediately after the eye is enucleated. He first allows the lids to assume their normal position and then places upon them a large, soft, moist sponge, and secures it firmly in position with a flannel bandage; this the patient is allowed to wear for twenty-four hours, when it is changed and the sponge is worn for the next twenty-four hours. Since he had adopted this plan he had not seen the slightest infiltration of the lids, or any reaction in the orbital tissues. He had employed the suture, but thought that by maintaining pressure consecutively for forty-eight hours a much better adaptation of the conjunctiva and muscles is obtained than by resorting to sutures or any other procedure.

DR. SCHELL referred to a case which occurred in his practice recently. It was in the person of a German lad, fifteen years of age, employed as a machinist, who had been struck in the eye by a particle of iron, producing an injury at the sclero-corneal junction. The fragment passed entirely into the globe and its extreme apex only could be seen projecting from behind the iris into the pupil. Dr. Schell succeeded in removing the fragment through the wound by means of a magnet. The sight at that time was ability to count fingers at two or three feet. The capsule of the lens was becoming opaque. The eye was protected from light and kept at rest and the patient recovered with vision of $\frac{20}{100}$ in the course of two months after the operation. During this time, however, the sight of the other eye had diminished and there were well-marked symptoms of neuro-retinitis. Heurteloup's leech was applied to the temple of the sympathizing eye, mercurial inunctions were used, with iodide of potassium internally, and the final result was that vision was increased to $\frac{20}{40}$ from $\frac{20}{100}$ to which it had fallen. There was no neuro-retinitis in the injured eye but only in its fellow, so far as could be seen through a cloudy capsule, by the ophthalmoscope.

DR. THEOBALD asked Dr. Spalding whether he thought in his case the neuro-retinitis in the second eye developed by direct transmission through the optic nerve.

DR. SPALDING replied that he thought the blood-vessels must have something to do with transmission; he did not think that the transmission was through the optic nerve under any circumstances.

DR. THEOBALD said he asked the question because several years ago he had a case under observation in which one eye was burned with aqua-ammonia, and very severe and obstinate corneal inflammation was set up, but no deeper inflammation ensued, if some choroidal congestion was excepted. In the other eye, however, a very marked congestion of the optic nerve developed, with great indistinctness of outline, and with slight cloudiness of the surrounding retina. The first eye was not enucleated, and after a long time the irritation in the opposite eye subsided and vision improved, although the patient complained somewhat. He did not think in this case the inflammation had extended along the optic nerve, but considered that the neuro-retinitis in the second eye was the result of reflected ciliary irritation, and that the localization of the inflammation in the neighborhood of the optic disk pointed especially to the influence of the *short* ciliary nerves, which enter the eyeball around the optic nerve. A circumscribed choroido-retinitis having developed at the

posterior pole of the eye, hyperæmia of the disk, and perhaps neuritis, would soon follow, owing to the free anastomosis which exists between the vessels of the disk and those of the surrounding choroid. He was not disposed to accept the views recently advanced regarding the origin of sympathetic inflammation by direct extension along the optic nerves, and thought that the cases of sympathetic neuritis which had been explained in this way might be accounted for more satisfactorily by supposing that the irritation is reflected especially through the short ciliary nerves, and that the inflammation extends from the surrounding choroid to the optic nerve in the manner suggested.

DR. MITTENDORF asked whether the intra-vaginal space of Schwalbe was examined, and the condition mentioned by Leber was noticed, namely, the presence of micrococci. He had examined and found in all cases of acute inflammation of this character immense quantities of micrococci; whereas, when no actual inflammation existed, and only a slight amount of irritation, no micrococci were found. He had not seen an eye with sympathetic inflammation recover perfect vision.

DR. SPALDING replied that the eye was not examined in the manner indicated, and that after it was enucleated the ball was lost.

DR. WILLIAMS said, with regard to the question of hemorrhage, that he had never had any difficulty in arresting it by means of the sponge-tent. He could not see how it was possible for hemorrhage to continue after the orbit was properly plugged in that way. But, after adopting the circular suture of Bowman, he did not know that he had had a case where it was necessary to apply the sponge-tent. He could not say that it would be impossible for hemorrhage to come on and force its way between the lips of the wound about the sutures; but he had not had it occur, and he thought it was one of the means of making pressure, and that it would offer considerable resistance to hemorrhage.

In answer to a question by DR. PROUT, viz.: How does the patient like it when the sponge-tent is removed?

DR. WILLIAMS said the patient does not like it at all, but the pain is but momentary. The only objection to the sponge-tent would be that secondary hemorrhage might come on when or soon after it was removed, in which case it must be temporarily reapplied. Of course, the removal of the sponge-tent is painful, but he takes a large pair of arterial forceps and extracts the sponge instantly, and in that way

reduces the amount of pain to its minimum. Twenty-four hours, he found, was sufficient time to allow it to remain.

DR. GREEN recalled a case of enucleation in which the bleeding was profuse and continuous. He first used ice-water without success, and then digital pressure, also without success. He finally took a narrow strip of linen and tamponed the orbital cavity, making external pressure with a bandage passing over the head, and the hemorrhage was checked. He allowed the tampon to remain in position twenty-four hours, at the end of which time it was removed without difficulty by a process of unravelling. The patient, he afterward learned, was the subject of the hemorrhagic diathesis.

DR. KNAPP referred to a procedure for the purpose of avoiding hemorrhage after enucleation. If we keep close to the sclerotic there will be very little hemorrhage. The greatest amount of hemorrhage occurs when the optic nerve is cut, because we are likely to get into the naturally cavernous tissue of the organ. This can be best avoided if, by pressing the speculum into the orbit, we force the eyeball to pop out, as it were. This probably well-known procedure puts the nerve upon the stretch, so that it can be more readily divided and the enucleation completed without cutting into the circular tissue of the orbit.

DR. MITTENDORF said that he did not use the sponge-tent, but simply applied a large, soft, moist sponge directly upon the closed lids.

DR. R. H. DERBY said that this was Von Graefe's schwammver band, and had been in use for many years.

THE PRESIDENT said that the suture referred to by Dr. Williams was very good, and that it assisted in securing union of the conjunctiva without adhesions. He had never had but one case of serious hemorrhage after enucleation, and that was one which required digital pressure. He had a case in which he enucleated an eyeball for a tumor which entered the antrum, and the bleeding was profuse. It was necessary then to control hemorrhage in a deep cavity, where few of the ordinary methods are applicable. In that instance he simply adopted what is known among gynecologists as the kite-tail tampon, made of pledgets of lint. When he came to evacuate the cavity he had comparatively little difficulty in removing the tampon, as the pledgets of lint came away one after the other by drawing gently upon the string.

DR. SEELY had never seen the necessity for using the conjunctival suture. Neither had he seen hemorrhage of a serious character. One of his assistants, however, applied

the sutures, and on the following day he was obliged to remove them under great difficulties. His experience had been that no wounds heal more kindly than those resulting from enucleation of the eyeball. More recently his assistants, after enucleation, have been in the habit of filling the orbit with boracic acid.

DR. BULLER thought the suture prevented the formation of button-like granulations, which sometimes occur after enucleation. With reference to hemorrhage, he had always applied a sponge compress in the manner mentioned by Dr. Mittendorf, and had not had any trouble from secondary hemorrhage.

REPORT OF THIRTY-FIVE CASES OF CATARACT EXTRACTION.

BY DAVID WEBSTER, M.D.,

NEW YORK.

I HEREWITH present, in tabular form, the records of thirty-five cataract extractions, comprising all that I have done, good and bad, from the beginning. All these operations were performed at the Manhattan Eye and Ear Hospital. Some of them will bear a fuller report than can be put into a table; I beg leave, therefore, to enter more fully into the details of some of the cases, with such cursory remarks as may seem relevant.

Case III. was that of a man who had long since lost his right eye, which was now in a state of *phthisis bulbi*. This was followed by detachment of the lower portion of his left retina, but he was still able to see to get about alone until his vision was entirely obscured by cataract. I operated upon him with the understanding that, in the most favorable event, he would see only well enough to find his way about alone. But we were disappointed in this, iritis set in, followed by closure of pupil. A subsequent iridectomy gave him a clear pupil, but no sight, and as nothing could be seen through

the pupil but darkness I concluded that the whole retina had become detached.

Case VI., a most unfortunate one in its results, was reported in detail to this Society in my paper on "Sympathetic Inflammation following Operations for Cataract," and will be found on page 21 of the "Transactions" for 1880 as "Case IV."

In Case X. the operation was without accident, the only indication of the probability of a bad result being the thinness and flaccidity of the cornea, and the inelasticity of the coats of the eye. Upon opening the eye two days after the operation the pupil was found blocked up by a whitish mass, and there was some redness of the globe, with considerable catarrhal secretion. Two days later sloughing of the cornea began at the wound. The incision was reopened with a probe, and a few drops of a straw-colored fluid escaped. Soon after the anterior chamber became filled with pus, the whole cornea sloughed, and the result was *phthisis bulbi*.

In Case XVII. while lacerating the periphery of the lens capsule, vitreous began to escape, and as the least pressure upon the eye, instead of causing the lens to present in the wound only increased the loss of vitreous, I was compelled to remove the lens with a Daviel's spoon. As the patient complained of considerable pain on the second day, the bandage was removed and a good deal of chemosis and swelling of the lids were found to exist. Twenty grains of calomel were given at once, two leeches were applied to the temple, and iced cloths were used upon the eye. On the third day it was noted that the chemosis was less, that the pain had ceased, that the iris was yellow and the pupil opaque. One-thirtieth of a grain of pilocarpine was given hypodermically. On the fourth and fifth days one-eighth of a grain of pilocarpine was in like manner administered. On the sixth day two more leeches were applied to the temple and ten grains of calomel were given. From this time on, there was gradual improvement, and the eye recovered with the iris "drawn up," causing complete closure of pupil, with normal tension and good perception of light. Two months later I per-

formed an iridectomy downward. On seizing the iris with forceps at about its middle, and making a little traction it easily broke away from its attachment in the region of the wound, and upon drawing it out and cutting it off I found I had made a narrow vertical pupil extending all the way across the eye. The eye recovered quickly from this operation, and with it the patient still sees sufficiently well to read diamond type.

Case XIX. was that of an old man with dense leucomata of both corneæ, upon both of whose eyes iridectomy had been performed by another surgeon, as he said, for the cure of his corneal ulcers. Subsequently to the healing of his corneal ulcers cataract had developed. The lens was removed without difficulty, and a subsequent needling was performed. The resulting vision, $\frac{4}{200}$, was as good as could have reasonably been expected.

Cases XX. and XXII. are the two eyes of a German woman who had suffered much from photopsiæ, and floating "black spots" and "clouds" before her eyes. An iridectomy had previously been done upon both eyes at the Homeopathic Hospital, corner of Twenty-third Street and Third Avenue. She had also been subject to severe attacks of hemicrania.

The lens was successfully extracted, without accident, from one eye on September 17, 1879, but an opaque capsule and some soft lens matter remained in the eye. She had iritis during convalescence, and the eye healed with a dense membrane and partial closure of pupil. I learned that this eye was afterward operated upon at Charity Hospital, but what the result was I do not know. I operated upon the second eye on October 1, 1879. The lens popped out very suddenly and vitreous presented at the wound, but none escaped. Panophthalmitis set in on the fourth day and destroyed the eye.

It is noted in her case that "the dense opacity on the anterior capsule was probably due to the inflammation which occurred at the time of the iridectomy, or, possibly, for which the iridectomy was performed." The history seems to show

that hers was a complicated case of cataract, and should not be brought in with uncomplicated cases to vitiate statistics.

In Case XXVIII. the patient died on the 27th day after the operation, which is a good reason, I think, for reporting the case in full. J. B——, aged sixty-five, was received into the hospital from a country poor-house, and was operated upon December 7, 1881.

Perception of light good, but projection doubtful in parts of field. Cataract of six years' duration. General health poor. Under the left eye is a peculiar growth, which seems to be cancerous or epitheliomatous in its nature. He said, however, that it had not increased in size for several years. Ether was given, and the lens was extracted through a modified Graefe's cut without much difficulty. Small membranous looking opacity still visible in pupil. A few minutes after the operation, when the nurse's attention was diverted, he suddenly tore the dressing from the eye.

December 8th.—Considerable swelling of lids. Bandage removed and iced cloths applied. Calomel, gr. xv., given, followed by saline cathartic.

December 9th.—Swelling of lids somewhat diminished.

December 11th.—Patient again unmanageable. He tore the bandage from his eyes and roamed about the building during the night. Notwithstanding this, the eye seemed to be doing well.

December 12th.—Patient again found out of bed, and wandering around the building. Administered chloral hydrate, gr. x.

December 14th.—Patient has been quiet during last few days under influence of chloral.

December 16th.—Some iritis. To have atropine applied.

December 18th.—Patient again unmanageable. Got out of bed and crawled under it.

December 31st.—An attack of dementia.

January 1, 1882.—Patient very weak; acts like one insane. Pulse weak, and signs of failure of heart.

January 3d.—Died very suddenly last night.

Autopsy the following day by Dr. T. Mitchell Prudden,

the pathologist of the hospital: "Œdema of lungs and brain; kidneys much atrophied; extensive degeneration of the arteries."

Although this patient's vision does not appear on the books I frequently tested it with my fingers, which he counted readily, and I have no doubt that had he lived his resulting vision would have been very good.

Case XXXII. was that of a prematurely old man, aged sixty, whose right eye had been the subject of a severe attack of inflammation some eight months before I saw him, leaving the upper two-thirds of the cornea covered with a dense leucoma while the lower third was quite hazy. He had mature cataract of both eyes, but was anxious to have the eye with the corneal opacity operated upon first. I accordingly extracted the cataract from this eye on September 25, 1882. The eye did well until the fourth day, when, being allowed to sit up, and groping about in the absence of an attendant, he struck it against the top of a chair-post in stooping. The next day a well-marked panophthalmitis had set in, and the result was an atrophic globe. Had this accident not occurred, the chances are that he would have recovered with sufficient sight in the eye to get about alone.

As this patient had but one eye left I thought that perhaps his chances would be better were I to do a preliminary iridectomy for him.

Accordingly ether was administered to him, on April 13, 1883, and when he seemed to be well under its influence I proceeded to operate. While the iridectomy knife was in the anterior chamber, however, the patient suddenly raised his head and at the same time contracted his orbicularis with great force. I instantly withdrew the knife from the eye, removed the fixation forceps, and took out the speculum. After more ether was given I excised the prolapsed iris. His aqueous leaked away until the fifth day, when, the wound having closed and the anterior chamber having been re-established, we found that the lens had been dislocated into the anterior chamber.

As Drs. Agnew, Pomeroy, and others, concurred with me

in the opinion that the sooner the dislocated lens was removed the better it would be for the eye, I proceeded to extract it one week after the preliminary iridectomy. As the iridectomy wound was still only partially healed I thought it would be safer to make the cut downward. This I did without difficulty, avoiding the lens, and enlarging the wound at one end with fine probe-pointed scissors. I then introduced a small, sharp hook beneath the lens and assisted it out of the eye without loss of vitreous. A very small piece of iris prolapsed and was cut off. Considerable cortical matter was left in the eye, but I thought it prudent not to meddle with it. The eye was not opened until the sixth day, but the dressing was removed daily and the lids washed with a saturated solution of boric acid. As the anterior chamber did not fill up quickly eserine was used several times, and on the tenth day the wound closed. The pupil was filled with cortical matter, which was slowly absorbed until the twenty-third day, when a considerable portion of it fell down into the bottom of the anterior chamber, and the patient suddenly saw. He improved rapidly from this time on until he was discharged on the forty-second day with vision $\frac{20}{40}$, with $+\frac{1}{4}$ s.$\frown+\frac{1}{20}$, c. ax. 180°.

Case XXVII. was interesting on account of the patient's having mucocele of both lachrymal sacs. Having seen disastrous results in several cases where a dacryocystitis had been treated by slitting up the canaliculus, and passing probes for some time before extracting the cataract, I concluded it would be better to let the tear-passage alone lest, by operating upon it, I should change a mucous into a muco-purulent discharge, and thus the more readily infect the wound. At Dr. Pomeroy's suggestion I washed the eye with a weak solution of carbolic acid immediately before operating, and on the first few occasions of opening the eye during convalescence. The eye was opened by the house surgeon several times daily, and the contents of the sac pressed out with the thumb and carefully wiped away. The recovery was unattended with inflammation.

Thirty-one different patients were operated upon, four of

them having the second eye operated upon after a short interval. Males, 20; females, 11. Total, 31.

Their ages ranged from 30 to 83.

Under 40 years of age	2
From 40 to 50 years of age	3
From 50 to 60 years of age	9
From 60 to 70 years of age	9
From 70 to 80 years of age	6
Upward of 80 years	2
	31

Twenty-eight eyes were operated upon while the patient was under ether. Of these twenty-three were successes, two partial successes, and three failures.

Seven eyes were operated upon without the use of an anæsthetic. Five of these did well, and two were failures.

The method of operating known as "von Graefe's modified" was used in all cases in which it was practicable. Where a preliminary iridectomy was done, the incision for extraction of the lens was made in the same position as in the other cases. Preliminary iridectomy was performed in six cases, four by myself, and two by another surgeon. Both the eyes of the patient who came to me with preliminary iridectomies did badly; the other four did well.

In only one case out of the whole thirty-five was there loss of vitreous. The same was the only case in which a scoop was introduced into the eye for removing the lens.

In one case there was dislocation of the lens into the anterior chamber during the preliminary iridectomy.

In one case irido-dialysis was produced during the operation, though so obscured by blood as not to be recognized until later; and in one case the iris fell before the knife, owing to premature escape of the aqueous, and was cut through.

In all these cases in which accidents occurred during the operation the eyes recovered with good sight.

In three cases the cornea was found thin and flaccid, and became wrinkled, or collapsed, on evacuation of the lens.

In eight cases there was hemorrhage from the iris imme-

diately following the iridectomy, showing an undue vascularity of that membrane, or an atheromatous condition of its blood-vessels.

In four cases a considerable quantity of soft lens matter was left in the eye.

In one case "some inflammatory reaction" was noted during recovery. This eye did well.

In four cases there was iritis. Closure of pupil resulted in three of these, and in one the result was good. In another the result was made good by an iridectomy.

Sloughing of the cornea occurred in one case, panophthalmitis in two cases, and in one case there was irido-cyclitis with sympathetic inflammation of the fellow eye.

Comparatively few secondary operations were required.

Iridectomy was performed in two cases, in both resulting in a clear pupil, but in one failing to restore sight on account of deeper disease.

Keratonyis for pupillary membranes was performed in seven cases, and was in all cases successful.

If we take the results of all the cases, complicated and uncomplicated, they will stand as follows: In 2 eyes, vision was $\frac{20}{30}$; in 3 eyes, $\frac{20}{40}$; in 6 eyes, $\frac{20}{50}$; in 8 eyes, $\frac{20}{70}$; in 3 eyes, $\frac{20}{100}$; in 4 eyes, $\frac{20}{200}$; in 1 eye, $\frac{20}{\text{Fingers}}$; in 1 eye, $\frac{4}{200}$; in 1 eye $\frac{2}{\text{Fingers}}$; in 1 eye, perception of light; in 5 eyes, 0.

I shall reckon the case which is recorded as counting fingers at twenty feet as a good result, as the patient did not know her letters; and the case of perception of light as a loss, although sight may have been restored by a subsequent operation. We will then have: successes, $27 = 77\frac{1}{7}$ per cent.; partial successes, $2 = 5\frac{5}{7}$ per cent.; failures, $6 = 17\frac{1}{7}$ per cent. I believe, however, that in justice to myself and to *cataract statistics*, I ought to exclude the two cases of extensive corneal opacity, the case of detachment of the retina, and the old German woman with vitreous, and perhaps deeper complications. The figures would then be very materially changed. We would have: successes, $27 = 90$ per cent.; partial successes, $1 = 3\frac{1}{3}$ per cent.; failures, $2 = 6\frac{2}{3}$ per cent.

No.	Age.	Sex.	General health.	Quality and duration of cataract.	Functional examination.	Method of operating; incidents; anæsthesia or not; remarks; after-treatment.	Time in Hospital.	Date of record; resulting vision.
1	56	M.	Has chronic bronchitis.	Hard.	Normal.	Graefe up. Cornea wrinkled; no accident; ether; no vomiting. Recovery smooth.	21 days.	21 days. V. = $\frac{20}{200}$, J. 2¼.
2	83	M.	Good.	Hard; 2½ years.	Normal.	Graefe up. No anæsthetic; bleeding from iris obscuring lens during capsulotomy. Smooth recovery.	17 days.	4 months. V. = $\frac{20}{30}$, J. 1.
3	40	M.	Fair.	Capsule opaque and soft cortex.	Apparently normal, as tested with candle.	Detachment of lower periphery of retina had been previously seen; fellow eye lost by irido-choroiditis fifteen years before; opaque capsule and soft lens matter left in eye; ether; iritis; closure of pupil. Iridectomy ten weeks later.	18 days.	V. = 0.
4	30	F.	Good.	Soft; 4 years.	Normal.	Graefe up. Ether; vomiting. Some soft lens matter left in pupil. Keratonyxis sixteen days later.	20 days.	6 weeks. V. = $\frac{20}{30}$, J. 1.
5	51	F.	Good.	Hard; 2½ years.	Normal.	Graefe up. Ether; no accident. Recovery smooth.	21 days.	21 days. V. = $\frac{20}{30}$, J. 1.
6	30	F.	Good.	Soft; 4 years.	Normal.	Graefe up. No anæsthetic; small wound; no hard nucleus found; irido-cyclitis; sympathetic inflammation of fellow eye. (Other eye of Case 4.)	28 days.	V. = 0.
7	69	M.	Good.	Hard.	Normal.	Graefe up. Ether; no accident; recovery smooth; keratonyxis seven years later. Old phthisis bulbi of fellow eye.	22 days.	7 years. V. = $\frac{20}{30}$, J. 1.
8	55	F.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; some inflammatory reaction. Iced cloths, leeches, and anodynes used.	30 days.	3 months. V. = $\frac{20}{30}$, J. 1.
9	67	M.	Subject to inflammatory rheumatism.	Hard; 2 years.	Normal.	Graefe up. Hemorrhage from iris; cornea thin and collapsed; ether attempted but failed; some cortex left. Keratonyxis 19 days later.	33 days.	30 days. V. = $\frac{20}{200}$.
10	67	M.	Good.	Hard.	Normal.	Graefe up. Ether. Cornea flaccid; some cortical matter left in pupil; sloughing of cornea.	14 days.	V. = 0.
11	54	M.	Good.	Hard; 3 years.	Normal.	Graefe up. Ether; hemorrhage from iris. Recovery smooth.	21 days.	21 days. V. = $\frac{20}{30}$.
12	68	M.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; no vomiting; iris fell in front of knife and was cut off in making section. Recovery smooth.	24 days.	6 months. V. = $\frac{20}{40}$, J. 1.

No.	Age.	Sex.	General health.	Quality and duration of cataract.	Functional examination.	Method of operating; incidents; anæsthesia or not; remarks; after-treatment.	Time in Hospital.	Date of record; resulting vision.
13	68	M.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; no vomiting; no accident. Recovery smooth. (Other eye of Case 12.)	19 days.	19 days. V. = $\frac{20}{50}$.
14	65	F.	Good, except rheumatism.	Hard.	Normal.	Graefe up. Preliminary iridectomy 5 weeks previous. Peripheral capsulotomy; had two needlings; no anæsthetic.	27 days.	3 months. V. = $\frac{20}{70}$.
15	76	M.	Good.	Hypermature.	Normal.	Graefe up. After preliminary iridectomy 6 weeks before; peripheral capsulotomy; ether. Smooth recovery.	21 days.	10 weeks. V. = $\frac{20}{100}$, J. 1.
16	70	M.	Good.	Hard; 10 years.	Normal.	Graefe up. Peripheral capsulotomy; ether. Smooth recovery; keratonyxis 2 months later.	21 days.	13 weeks. V. = $\frac{20}{70}$.
17	50	F.	Good.	Hard; 2 years.	Normal.	Graefe up. No anæsthetic; peripheral capsulotomy; loss of vitreous, and lens removed with scoop; chemosis; closure of pupil. Iridectomy 2 months later.	24 days.	4 months. V. = $\frac{20}{40}$.
18	49	M.	Good.	Hard; 10 months.	Normal.	Graefe up. Peripheral capsulotomy; ether; keratonyxis 20 days later.	23 days.	2 months. V. = $\frac{20}{30}$, J. 1.
19	72	M.	Poor.	Hard; 6 years, extensive corneal opacity.	Projection normal.	Graefe down, cutting through periphery of iris. Ether; no vomiting; keratonyxis 3 months later. Previous iridectomy for corneal ulcer.	12 days.	1 year. V. = $\frac{4}{200}$.
20	52	F.	Subject to hemicrania.	Hard.	Floating black spots in field.	Graefe up. Preliminary iridectomy by another surgeon 4 months before. Peripheral capsulotomy; iritis, resulting in closure of pupil; ether; slight vomiting.	30 days.	V. = perception of light.
21	64	F.	Fair.	Hard; 3 years.	Normal.	Graefe up. Ether; no vomiting; peripheral capsulotomy. Local atropine poisoning during recovery.	15 days.	4 years. V. = $\frac{20}{60}$.
22	52	F.	Subject to hemicrania.	Hard.	Floating black spots and photopsiæ.	Graefe up. Preliminary iridectomy by another surgeon 5 months previously. Peripheral capsulotomy; lens popped out suddenly and vitreous presented but none escaped; panophthalmitis; no anæsthetic. (Other eye of Case 20.)	35 days.	V. = 0.
23	47	M.	Good.	Hard; 16 months.	Normal.	Graefe up. Peripheral capsulotomy; ether; slight vomiting; recovery smooth; keratonyxis 6 weeks later.	21 days.	1 year. V. = $\frac{20}{30}$.

24	38	M.	Good.	Hard.	Normal.	Graefe up. Peripheral capsulotomy; ether; chemosis third day; calomel, gr. xv., followed by magnes. sulph.; hypopyon on thirteenth day; paracentesis; eye well on 42d day.	20 days.	V. = $\frac{20}{100}$.
25	61	M.	Good.	Hard.	Normal.	Graefe up. Bleeding from iris into pupil; ether; no vomiting; peripheral capsulotomy; membrane in pupil.	21 days.	21 days. V. = $\frac{20}{200}$.
26	50	F.	Good.	Hard.	Normal.	Graefe up. Bleeding from cut iris; ether; no vomiting; after absorption of blood, irido-dialysis found.	21 days.	V. = $\frac{20}{\text{Fingers.}}$
27	54	F.	Good.	Hard.	Good field.	Graefe up. No anæsthetic; mucocele of both lachrymal sacs and stillicidium.	19 days.	19 days. V. = $\frac{20}{200}$.
28	65	M.	Poor.	Hard; 6 years.	Normal.	Graefe up. Ether acted badly; iritis; patient died on 27th day. Autopsy revealed atrophy of the kidneys.	27 days.	V. = $\frac{2}{\text{Fingers.}}$
29	53	F.	Good.	Hard.	Normal.	Graefe up. Hemorrhage into pupil from cut iris; ether. Recovery smooth.	28 days.	28 days. V. = $\frac{20}{70}$.
30	68	M.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; pupil filled wiih blood from cut iris; iritis, mild.	21 days.	4 weeks. V. = $\frac{20}{50}$.
31	81	M.	Poor.	Hard; 4 years.	Normal.	Graefe up. Hemorrhage into anterior chamber from cut iris; no anæsthetic; slight iritis.	18 days.	3 months. V. = $\frac{20}{1000}$.
32	60	M.	Good, except chills.	Hard; large old corneal opacity.	Projection bad in places.	Graefe up. Ether; eye did well till fourth day when patient struck it against a chair-post in stooping; panophthalmitis.	30 days.	V. = 0.
33	70	M.	Poor.	Hard; 5 years.	Normal.	Graefe up. After preliminary iridectomy 7 weeks previously. Ether; vomiting and straining. Recovery smooth. (Other eye lost by operation 6 years before.)	21 days.	7 months. V. = $\frac{20}{30}$.
34	61	M.	Chills and fever.	Hard; 2 years.	Normal.	Lens dislocated into anterior chamber during preliminary iridectomy; removed by sharp hook one week later through downward cut, without loss of vitreous; considerable cortex left; ether. Recovery smooth. (Other eye of Case 32.)	42 days.	42 days. V. = $\frac{20}{40}$.
35	62	M.	Good.	Hard; 4 years.	Normal.	Graefe up. Ether. Recovery smooth.	18 days.	18 days. V. = $\frac{20}{70}$.

REMARKS.

DR. HEYL said that the case of sloughing cornea referred to by Dr. Webster recalled a clinical experience which is suggestive of the thought that sloughing cornea following cataract extraction may sometimes be due to diphtheritic infection, and should be treated accordingly. He had noticed in one instance that a short period, perhaps a couple of days, after a Graefe extraction inflammatory action was developed in the eye. The pupillary space became filled with a whitish mass which projected between the lips of the cut. On the lower half of the cornea a yellowish semicircle formed, perhaps, a millimetre in breadth, and distant from the limbus perhaps two millimetres. The cornea was steamy. Encircling the limbus was a girdle of conjunctiva elevated by subconjunctival infiltration. The upper lid was œdematous; there was no false membrane. The symptoms, with exception of the whitish mass blocking the pupil, correspond to what he had observed a number of times in cases of subacute conjunctival diphtheria. The semicircular infiltration of the cornea was rather peculiar, the opening of the ring corresponded with the cut. In his experience usually the corneal affection is in the form of an opaque area, which breaking down forms a deep ulcer. He had, however, once seen an opacity similar to the one above mentioned, except that instead of being a semicircle it was a complete circle. The pupillary mass must, he thought, have been a bacterial formation. In confirmation of the view that this was a case of traumatic diphtheritis, a patient in the same ward, and but a few beds distant, on whom extirpation of the orbital contents for malignant disease had been performed, was attacked by traumatic diphtheritis; also two attendants in the hospital at the same time were attacked with pharyngeal diphtheria. Another point was suggested in this connection. The secondary operations in Dr. Webster's cases had been followed by no unpleasant result. Dr. Heyl had a year ago extracted a cataract, and subsequently divided the capsule without unusual reaction, with the effect of giving the patient sight sufficient to pursue his occupation, that of a clerk. A hole of good size had been made in the capsule, surrounded, however, by a margin of thin veil-like tissue. At the solicitation of the patient he was induced to try if he could not further improve sight. After doing the best that could be done by glasses, he advised that the veil-like margin of capsule be divided. There was apparently no irritability of the eye. The extrac-

tion cut had been a little peripheral, and in one corner a prolapsed portion of iris had healed in the wound. The second division of the capsule was performed without any difficulty. On the third day after the operation cyclitis was developed, followed by total loss of sight. Whether the engagement of the iris in the corneal cut had placed the eye in a condition favorable for the development of cyclitis, whether an unsound condition of the eye previous to the extraction was the cause, or whether this was a case of traumatic inoculation is not known.

DR. STRAWBRIDGE asked, first, was ether used, and if so why; second, was atropia used in the after-treatment; third, were antiseptic dressings used in the after-treatment.

DR. WEBSTER replied that he gave ether in most of the cases, and because the patients wished it. Atropia was used in forty-eight hours after the operation in most cases, but not always. Antiseptics were only used in the case of mucocele, and there the eye was simply washed with a solution of carbolic acid.

DR. THEOBALD would like to ask Dr. Webster whether, in the case in which the patient became irrational, he noticed any connection between the instillations of atropia and the appearance of the mental aberration. He had seen one case where the use of atropia was followed by mild symptoms of dementia.

DR. WEBSTER replied that he did not think that the mental disturbance was attributable to the atropia at all, and most of the gentlemen who saw the case thought that the ether had something to do with it, as the patient had Bright's disease.

DR. CARMALT, with reference to the assumption that mental disturbance might follow the use of ether, mentioned a case in which active delirium came on the third or fourth day after the operation without ether. He believed the delirium to be mainly due to the confinement in bed in a blinded condition, in which state the patients "lose their bearings" altogether. He had not infrequently met the same thing in patients blinded by accident and put to bed immediately afterward.

THE PRESIDENT remarked, that it was well established that symptoms of dementia can be produced by atropia. He did not believe that the ether had anything to do with the development of these symptoms, and that in Dr. Webster's case the condition was more likely due to anæmia or some general condition of the patient; at all events, he did not think that the ether had anything to do with it.

NOTES ON OCULAR THERAPEUTICS.

By W. W. SEELY, M.D.,

CINCINNATI, O.

THE first point I desire to notice is in the use of the yellow oxide of mercury in external ocular troubles. Probably every one has found the use of this remedy, whether in corneal or conjunctival diseases, like calomel in the past, often attended with pain. This often-recurring fact and disadvantage led me some time ago to institute some investigations in regard to the cause or causes.

So far as regards the strength of the preparation, I have found that ten grains to the ounce of the vehicle is the best for all purposes. When I began to enquire into the mode of action of the yellow oxide I found that this preparation was regarded chemically as an insoluble substance. My theory in regard to its action at first was, copying from the supposed action of calomel, that a chemical change occurred; but finding that it was an insoluble substance, and hence inert, this explanation seemed to fail.

I took a large number of specimens, and had them analyzed, and found that all the so-called "chemically pure" preparations contained more or less bichloride, and the inference from this was that its action depended on this residuum in its manufacture.

My assistant, Dr. Caldwell, has lately been working at the subject, and is satisfied that there is a certain amount of solubility in the yellow oxide, to what degree tests have not decided.

One point seems settled—that the less bichloride a preparation contains, the less the pain produced by the salve, efficiency remaining the same.

I desire to add one more practical point in the use of the yellow oxide and vaseline, as devised by myself some years ago in conjunctival affections. Those who have used this combination have doubtless found that in cases where there is a profusion of tears the salve is so quickly washed out that little or no benefit results. In such cases I substitute eserine or the bichloride in solution to contract the blood-vessels.

The strength of the bichloride solution that seems to answer every purpose is one part to seven or eight thousand (one grain to sixteen ounces water), or about one-third the strength preventive of the growth of the bacteria of ordinary decomposition.

Such a solution, entirely painless, has often, in my hands, set aside an acute catarrhal conjunctivitis of violent type—after one to three or four thorough drenchings of the conjunctiva.

This is the strength I have used for a long time as an antiseptic in various operations.

In corneal affections I still use, as I have done for a long series of years, a four-grain solution of eserine.

I merely state this to introduce a point I regard of great practical importance. In my hands one thorough application of a four-grain solution *once a day* acts altogether better than more frequent applications, either of the same solution or that of weaker ones.

This remark applies to all classes of cases.

One point more in regard to eserine. For the reduction of intra-ocular tension eserine has for me entirely done away with paracentesis, and for so long a time and so completely that this procedure has really only an historical interest.

Everyone has met with cases of iritis in which atropine does not seem to act promptly and satisfactorily, possibly because an increased tension prevents its entrance, *or possibly because of the extreme vascularity of the iris*, which I regard as the more probable.

In such cases, instead of making paracentesis or abstracting blood, I instil once a day a few drops of a four-grain solution of eserine. In fact, the habit of instilling eserine once a day

in iritic cases has become a routine practice, the patient using the mydriatic in the ordinary manner. Iritis is the only disease in which I employ a mydriatic as the fundamental remedy.

In more than one case I have seen adhesions let go under the combined action of the myotic and mydriatic that had resisted the latter alone. In my judgment eserine is the remedy par excellence in corneal affections. In cases in which mydriasis is necessary this latter can be produced perfectly and still the specific effects of the myotic kept up. This is beautifully illustrated in suppurative inflammation after cataract operations, formerly so unsuccessfully treated by heat and atropine.

REMARKS.

DR. MCKAY said that some years ago he became interested in an article written by Dr. Seely, and published in one of the Western journals, in which the use of the yellow oxide of mercury was spoken of very highly. Since that time he had resorted to its use in nearly all cases in which an astringent has been considered desirable in conjunctival troubles, and so far had been very favorably impressed with its effects.

DR. GRUENING said, with reference to the alternate use of mydriatics and myotics for breaking up adhesions, that the method was not quite new. He had seen it resorted to in Paris in 1868.

With regard to eserine in iritis that was something entirely new, and he should regard it as a most dangerous practice. He could produce iritis with eserine at any time in a healthy eye, and also in a diseased eye. His experience had been that iritis was aggravated by eserine. He had used eserine after cataract operations and had set up iritis. In cases of suppurative keratitis he had ceased to employ eserine completely.

DR. KNAPP said, with reference to the use of eserine and atropine, that eserine is apt to produce iritis, and may even be injurious after iridectomy for glaucoma. But there are some forms of iritis, especially the serous variety, where the alternate use of these two remedies is of advantage. Again, in plastic iritis, when there is increase of tension which produces intense pain, the patient sometimes is considerably relieved by the instillation of a drop of eserine.

DR. SEELY said he wished to correct what seems to have been an erroneous impression. It was not the *alternate* use

of eserine of which he wished to speak; not at all. He simply spoke of the use of eserine *once* a day for the purpose of contracting the blood-vessels, so that the atropine could pass through the corneal tissue more freely. In that way he thought we were able to get up a more free dilatation of the pupil than could be done without the eserine. He had never seen a case in which eserine had produced iritis, and he had used immense quantities of it. He employed it in conjunctival troubles, always in corneal difficulties, once a day in cases of iritis which came to the dispensary, of course maintaining mydriasis by the use of atropine.

DR. KNAPP had given eserine a faithful trial in corneal inflammation since Thalberg published his observations on keratitis from inunction. He had used it in many cases, and at first thought it controlled this process, but later he had not seen that its beneficial action was in any way constant.

DR. MCKAY said that in corneal ulcers it had been his habit recently to use atropine until the inflammation had subsided, and then he used eserine with very good effects, and after such use of eserine he could concur quite fully in what Dr. Seely had said about that drug.

THE TREATMENT OF DETACHMENT OF THE RETINA.

BY W. F. MITTENDORF, M.D.,

NEW YORK.

DURING the last three years I have been called upon to treat several cases of very extensive detachment of the retina, occurring in patients that had only one useful eye, the other one being entirely blind or absent.

The good results obtained by the treatment of these eyes, which were practically blind when I saw them first, encourages me to report them to-day. Although no new remedy or method had been used, it is the combination of the different plans devised for the treatment of this affection and the mode of administering the remedies that has led to the success. On account of the uncertainty of operative measures these had not been resorted to.

Before giving a history of these patients I must say that it is evident that a detachment of the retina may be due to different causes. Those cases which are due to contraction or atrophy of the vitreous humor, to which Professor Leber, of Göttingen, has lately called attention, and which are often accompanied by a rupture of the retina, would perhaps resist all means of treatment, but those resulting from serous effusion, due to irritation of the choroid, as we have it occur so often in highly myopic eyes or even where a choroidal hemorrhage, traumatic as well as idiopathic, is the cause, an attempt should always be made to save the eye, especially if this is the only one left to the patient.

The object of the treatment must be in the first place to keep the eye as free as possible from all irritating influences, and this is done best by closing both eyes by means of a bandage, or by putting the patient in a dark room. Second, to keep the eye quiet and avoid all accommodative efforts which would naturally affect the choroid. For this purpose the eye must be kept under the influence of a mydriatic—atropine for instance. No myotics should be used locally, and my experience agrees with that of Dr. Knapp, who mentioned, in the discussion that followed the report of Dr. Green's case two years ago, that he had never seen any good effect of the local use of pilocarpine or eserine in these cases. These remedies would naturally put the choroid more or less on a stretch. Another indication in the treatment of a detachment of the retina is to place the absorbents in the most favorable condition. This is accomplished by means of a pressure bandage, and I have found the elastic pressure procured by means of the rubber bandage, to be of the greatest help; the one usually employed for surgical purposes will answer the purpose, or an ordinary flannel bandage may be arranged in such a way as to have one turn to go around the head, another over the chin connecting with the first behind the ears, and a connecting piece made of strong elastic material to go over the eye. In this manner the bandage will be tolerated by the patient for a long time, and enough pressure can be exerted to be of benefit.

Another indication is to hasten the absorption of the effused fluid, if this be the cause of the detachment. This can be accomplished by the use of jaborandi or pilocarpine, which, by increasing the excretion of fluids from the body, will lead to a speedy absorption of the sub-retinal effusion. The remedy is conveniently applied, and has frequently been used for this very same purpose in the shape of hypodermic injections; but the effect of even a liberal dose of it, administered in this manner, will affect the system only for a short time, and if given in larger doses it may affect the patient so seriously that its use may have to be discontinued. I have given, therefore, an injection of pilocarpine $\frac{1}{8}$ to $\frac{1}{6}$ of a grain early in the morning, and have kept up the diaphoresis, which sets in very soon, by the use of an infusion of the jaborandi leaves. Forty grains to one drachm to twelve ounces of water will make a pretty strong infusion, which, if administered in wine-glass doses during the afternoon and evening, will keep the patient in a state of moderately profuse perspiration during the entire twenty-four hours; this treatment is to be kept up for three or four weeks. I have not seen a single case in which this remedy, administered in the just mentioned way, had to be discontinued on account of unpleasant symptoms; and although the patient would feel uncomfortable in the beginning, the diaphoresis would go on more comfortably after a short time. If the detachment complicates a specific choroiditis, or if it follows a serous iritis demanding a specific treatment, this may be used at the same time with the other remedies mentioned. In these cases it will not be necessary to push the pilocarpine to a great extent, and the disease is apt to yield, as a rule, sooner than in other cases.

The following cases occurred partly in my private practice and partly in my service at the New York Eye and Ear Infirmary, and will serve to illustrate the severity of the affection:

Case I.—Mr. F. W. S——, a German, forty-nine years of age, and married, was brought to my office June 3, 1881, with the following history: Patient is near-sighted, and has been so as long as he can remember; he comes from a near-

sighted family. He had not used glasses until ten years ago. About twenty years ago he discovered, quite accidentally, that his left eye was blind. It is now quite amaurotic, probably in consequence of a complicated cataract. The lens is very white and hard, and there are numerous posterior synechiæ; the iris is atrophic. This eye is now in a perfectly quiet state, is not tender on pressure, is not congested, and has not given any trouble for many years. The right eye has been near-sighted, and patient has been using a —6 for nearly ten years. This glass did not correct the entire amount of the myopia; but Mr. S. has been able to attend to his business as a grocer without any difficulty, nor did he notice anything unusual about the eye up to a few days ago. Two nights before his first visit to my office he had a very difficult passage; he was suffering from hemorrhoidal trouble. The next morning he noticed dark objects floating up and down before his eye. Patient says they appear like angels going up and down in a dense cloud. There is a large central scotoma. V.=fingers in six inches at temporal side.

The ophthalmoscope reveals a large posterior staphyloma; nerve red and muddy. Vitreous humor somewhat cloudy, due to small floating opacities. The retina is almost entirely detached, including the region of the yellow spot. The detachment is most marked and quite elevated at the lower and outer part. The nasal portion is not near so much affected, presenting no wavy appearance, and patient has some vision at this side. The patient was seen by Dr. Derby in consultation, who agreed with me in the diagnosis of total detachment of the retina.

The patient was put to bed. Atropine had been applied previously for diagnostic purposes; an elastic pressure bandage was applied and an injection of one-fourth of a grain of pilocarpine was used in the morning. This produced some slightly unpleasant, suffocating sensation, which was, however, soon followed by profuse perspiration which lasted for several hours. The patient dreaded the hypodermic injection, which had been made in the temporal region, and I ordered an infusion of jaborandi, about fifteen grains to a wineglassful of

water, one to be given at 6 and one at 11 P.M. This started the perspiration again in a short time without any unpleasant feeling, and continued during the entire night.

The next morning at 9 A.M. patient was feeling perfectly well; temperature and pulse normal; skin slightly moist. On removing the bandage the patient, who had never seen me before, tells me that he can see that I have got a beard. The same treatment, a hypodermic injection of one-sixth of a grain of pilocarpine, applied to the temporal region, which is followed by three fifteen-grain doses of jaborandi, is continued. On the third morning the patient can see the gas-fixtures in the middle of the room, and after a continuation of the treatment for three weeks the patient is able to see with a $-6\frac{xu}{cc}$. The field is almost perfect; uncertain in an upper and inner direction. Fundus is still slightly blurred; red reflex not perfect; retina a little pale, and some vessels still a little raised. Patient complains that there is still a little haze over the eyes. Ordered for several days two doses of fifteen grains of jaborandi in infusion and rest. Patient's vision clears up somewhat but fundus of eye remains about the same. Six months later vision the same; one year later vision almost $\frac{20}{c}$; two years later, $\frac{xu}{cc}$.

The second case is that of a Mr. J. E. McC——, sixty years of age, American, living in Geneseo, N. Y. The patient lost his left eye some twenty years ago; stump is in good condition, not painful. Has always enjoyed good sight in the right eye up to October, 1882.

Cutting wood one day, a piece of it flew against his eye, causing severe contusion of the lids, and giving him a black eye, as he calls it. This disappeared in a few weeks. Four weeks after the first injury, while working in a field on his farm, he felt a dimness come over his eye, not accompanied by any pain. This grew dark so rapidly that he could hardly find his way home. A week later he went to Rochester for advice, but was told that he had a detachment of the retina, and that nothing could be done for him.

He was brought to me by a friend of his, a New York physician, about six months after the attack. Patient is a

strong-looking man for his age, but is greatly depressed on account of his sad condition; he has only perception of light, and this is not good in all parts, somewhat better in a downward direction. On examination, the entire retina, with the exception of a small triangular section in the upper and nasal portion, is detached; the optic nerve appears slightly blurred and much congested. Patient was at first treated by hypodermic injections of pilocarpine alone, beginning with one-eighth of a grain, which was increased to one-third of a grain. This would be followed by slight febrile symptoms and profuse perspiration, lasting for several hours. After continuing this treatment for four or five days, no perceptible improvement could be noticed. A pressure bandage was now applied, the injection of pilocarpine, followed by the administration of the infusion of jaborandi, representing ten grains of the leaves for each dose, which was given four or five times during the day, so as to keep up a constant sweating. Atropine and position on back were continued, and within three days the patient was able to eat alone, a thing which he had not done for many months. After three weeks' treatment, patient has a vision of $\frac{5}{CC}$, and the field of vision was almost perfect. He was able to leave for home alone, but expects to return in the fall to see whether any greater improvement can be obtained by submitting to a similar treatment.

The next case is that of Mr. B——, German, married, and thirty-nine years of age. He complains that the sight of the right eye has been failing for some time; not only that the sight is poor ($\frac{5}{CC}$), but he sees dark objects floating up and down. He gives a history of syphilis, and upon examining the interior of the eye many vitreous opacities are seen, and several oblong bluish patches, especially along the course of the retinal vessels, are found. Some of these are decidedly elevated, but no motion can be seen in any of them when the eye is moved. Tension about normal, perhaps a little less. The other eye is slightly myopic; -20 gives a V. $= 1$. The diagnosis was specific choroiditis, and the mixed treatment was commenced at once. But little improvement could be recorded for the first few weeks. A short time after this

he was brought to the infirmary, with the history that on stooping to pick up something from the floor he noticed a cloud spreading over the good left eye, with which he barely counts fingers. The sight of the right eye has also deteriorated, so that he is now practically blind. Upon ophthalmoscopic examination an extensive retinal detachment, of the appearance of a bluish, wavy vesicle, is seen projecting far into the vitreous, and occupying especially the outer and inner quadrant of the retina; tension of this eye, = — 1.

Patient is put to bed at once, and a vigorous treatment of pilocarpine, with a pressure bandage over both eyes, is resorted to, in the same manner as reported before, with the addition of the administration of $_{3}^{1}{}_{2}$ of the biniode of hydrarg. and 10 grains of iodide of potassium twice a day. Patient began soon to improve, especially in the right eye, and he had, after one week, a vision of $\frac{20}{CC}$; the left eye, however, had only a vision of $\frac{10}{CC}$, with a — 36 (the best glass), after a three weeks' course.

Further treatment was irregular, as the patient commenced to make a living as a peddler. Six months after treatment the vision is just the same as before. This spring, two years after the first stay at the hospital, the vision in the left eye is fingers at 6 inches only, and the right one has V. = $\frac{5}{CC}$. He has not used glasses, because they annoy him, and proposes to return to the hospital during the summer, in order to see whether his vision can be brought to what it was before.

These cases go to show, first, that in marked detachment of the retina the energetic use of jaborandi and pilocarpine will do good, especially if the patient can be kept under the influence of the drug during the entire day, and for a period varying between twenty and thirty days; second, that the elastic pressure bandage must be used at the same time; third, that the patient be kept on his back most of this time; and, fourth, that the use of atropia, which is employed without causing any inconvenience to the patient, should likewise not be neglected.

REMARKS.

DR. GRUENING said there was one important point which should be mentioned, and that was, how long has improvement lasted in Dr. Mittendorf's cases.

DR. MITTENDORF replied that in one case nearly two years, in another case about six months, and in the other two years.

DR. LITTLE asked what influence the plan of treatment had upon detachment of the retina from hemorrhage of the choroid or ciliary body.

DR. MITTENDORF said he had not had any experience in that direction.

DR. ANDREWS asked how long the patients were confined to bed.

DR. MITTENDORF answered that he wished to keep them in bed from twenty to thirty days.

DR. ANDREWS asked Dr. Mittendorf if he ascribed the good results to the use of pilocarpine or to the rest.

DR. MITTENDORF replied, to both.

DR. ANDREWS said that three years ago, he took nitrate of pilocarpine to the Manhattan Eye and Ear Hospital, and the house surgeon, Dr. Stowell used it hypodermically in a number of instances without any results. But Dr. Andrews thought that the failure was due to the fact that the patients were not in-door patients. He had used the remedy a few times in private practice, and in one case he had observed good results, but he ascribed them however, to the rest enjoined.

DR. SPALDING wished to say a few words with regard to the operative treatment of these cases. He saw last year in Mooren, "Fünf Lustren Ophthalmologischer Arbeit," a suggestion concerning the removal of this effusion by the use of the hypodermic syringe. Having a case on hand he tried the operation. Although he removed in the syringe a considerable quantity of the sub-retinal effusion or fluid, there was not much improvement except temporarily; the suggestion appeared to him to be desirable, because it seemed very natural that the effusion could be most surely removed by some such method as suction. The only difficulty with the hypodermic syringe is that it is too stiff, and he would suggest that this method might be cultivated by inserting a rubber tube between the end of the needle and the nozzle of the syringe, and in that way making an instrument somewhat similar to that which is used for the removal of soft cataract. He should think that the best manner for applying this prin-

ciple would be by means of some form of aspirator so as to draw the fluid from between the retina and the choroid.

DR. WEBSTER had had experience in one case of the use of hypodermic injection of pilocarpin in the Manhattan Eye and Ear Hospital. Some fifteen or twenty injections were given without any benefit. The case occurred in an out-patient. About the time the injections were ceased abscesses began to develop, and at every point where a puncture had been made an abscess formed. Possibly if the patient had been kept in bed, the result would have been better. He had reported to the Society two cases in which the retina was re attached by simply keeping the patient in bed two or three weeks. He also thought Dr. Prout had reported a case treated in the same way.

DR. THEOBALD asked Dr. Mittendorf if he believed any advantage accrued from giving pilocarpine hypodermically. He had employed it in some cases, but had not thought it necessary to give it hypodermically, as he obtained the full constitutional effects of the drug by administering it by the mouth.

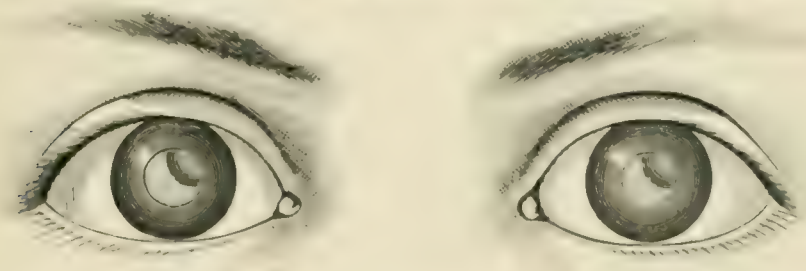
TWO CASES OF ECTOPIA LENTIS, CONGENITAL DOUBLE; ONE CASE NON-SYMMETRICAL, THE OTHER SYMMETRICAL.

(*With woodcuts.*)

BY W. S. LITTLE, M.D.,

PHILADELPHIA, PA.

MR. ——, aged twenty-three, was seen January 2, 1880. Is very tall and spare; has a malformed chest-wall and nævus



Non-Symmetrical.

on right hand. Right eye divergent strabismus. Tremulous iris in each eye; states a cousin is similarly affected; father is color-blind. Has experienced no trouble with his eyes, be-

yond the discomfort of restricted vision and annoyance of holding objects very close and uses only the left eye. Has been living in the country but desires to gain a position in the city.

R. E., V. = $\frac{3}{C}$.

L. E., V. = $\frac{5}{LXX}$.

R. E. (mydriatic): Pupil dilated very slightly. Crystalline lens is displaced upward and inward at about 45°; the lower margin of lens appears about the lower third of pupil; some vitreous opacities exist, but lens is clear as far as can be observed. Field of vision good. Tension of eyeball slightly reduced: + 8 ⌒ + 12 cyl .ax. 180°; V. = $\frac{15}{LXX}$; + 3 ⌒ + 12 cyl. ax. 180°; Snellen VI. at 12″.

L. E.: lens in same position as R. E. at the sclero-corneal margin up and out at 45°; there is a slight prominence, more so than in R. E., corresponding to the position of the lens. Lens clear, also vitreous. Tension — $\frac{1}{2}$; + 8 ⌒ + 18 cyl. ax. 180° = $\frac{15}{LXX}$; + 3 ⌒ + 18 cyl. ax. 180°; Snellen I. at 12″.

Glasses were ordered as above.

November 2, 1880.—Had worn glasses with comfort and was in a position earning his living.

R. E., + 7 ⌒ + 12 cyl. ax. 180°; V. = $\frac{15}{LXX}$. L. E., + 7 ⌒ + 18 cyl. ax. 180°; V. = $\frac{15}{XXX}$; + 4 ⌒ with cylinders were given for writing.

Seen February 17, 1882.—R. E., V. = $\frac{15}{LXX}$. L. E., V. = $\frac{15}{XX}$ (with glasses). Has no trouble.

April 5, 1883.—Consulted me, stating that his vision in the L. E. was bad, and had become so suddenly. A few evenings before I saw him, as he was walking, he thought some one had struck at him and he dodged the blow, when on looking around he could observe no one near him to have done so; vision has been bad since.

Externally the L. E. on the outer scleral side shows rupture of an episcleral vessel. The tension of eye is reduced beyond the R. E. Objects the first few days appeared red; are now yellowish. Field is limited to objects on left side; central vision is lost. Ophthalmoscope shows a detachment of retina, slight in extent, up and out, dependent, and inter-

fering with central sight. He was leeched; given potassa iodid.

April 16th.—Vision had improved. I gave muriate ammonia internally.

June 22d.—Sees objects down and in and out sufficiently for protection; central vision defective; no total loss of field. V. = $\frac{15}{xx}$; sees better in sunlight. If I am correct, observes the fluctuation of the slight detachment as it is reflected from his lens.

R. E., + 7, V. = $\frac{15}{xl}$; + 4, Jaeger No. 1 at 8″.

The left eye is now diverging, the right eye doing the work. Vision had improved a little in the L. E. when last heard from. The non-symmetrical position of the lenses in this case, is of interest; and the question arises, as to what influence the glasses may have had in producing the condition in the left eye.

The immunity for three years and freedom from trouble, favors strongly their not being a factor. He had become able to see so well and became so interested in his pursuits that he had come to accept responsibilities, sufficiently difficult for a well-formed eye. He bleeds very easily when scratched. Whether a neevoid condition existed in the left eye, as elsewhere on his person, is, of course, impossible to consider. The sketch of the case by Dr. J. M. Taylor is accurate. (See woodcut on page 522.)

Symmetrical.

In addition to this case I desire to present another case, one of symmetrical ectopia lentis as occurring in the practice of C. S. Turnbull, M.D., of Philadelphia, and treated in the same way as my own. Dr. J. M. Taylor has sketched it very accurately. (See woodcut above.) The patient was a male,

aged sixteen, tall and spare. V. = $\frac{5}{CC}$ (binocular). Jaeger No. 4 at $\frac{1}{2}''$, R. E.; No. 4 at $2''$, L. E.

Seen October 3, 1880.—Pupils dilated about one-half, under atropia; lenses misplaced down and inward in each eye. Lenses slightly opaque.

R. E., + 4, V. = $\frac{15}{XL}$, + $2\frac{3}{4}$. Jaeger No. 1 at $8''$. L. E., + $3\frac{1}{2}$, V. = $\frac{15}{XL}$, + $2\frac{1}{4}$. Jaeger No. 1 at $8''$.

Patient had a contracted, highly vaulted roof of mouth; also mitral insufficiency. He wore his glasses with great comfort for over a year; was accidentally killed.

REMARKS.

DR. MITTENDORF referred to a case occurring in a girl, twenty-three years of age, otherwise perfectly healthy, who complained of her eyes, and on examination he found that the lenses were dislocated inward and upward. He gave the patient plus two and a half for near and four for distant vision, and she got on very well. He suspected that in this instance the difficulty was due to arrest of development in the suspensory ligament, and besides the lens was also smaller than normal and of different refractive power.

ON THE EMPLOYMENT OF NITROUS OXIDE AS AN ANÆSTHETIC IN OPHTHALMIC OPERATIONS.

BY GEO. T. STEVENS, M.D.,

NEW YORK.

WHILE the use of nitrous oxide gas as an anæsthetic is no novelty, its employment has been so largely confined to operations upon the teeth that its merits in other classes of surgical operations have been to some extent overlooked.

Its more general use in ophthalmic surgery would doubtless be greatly to the advantage of patients and surgeons.

Laughing-gas, in certain classes of operations, possesses several advantages over all other anæsthetics. It is the least dangerous, its use is not attended with nausea, headache, and other unpleasant symptoms characteristic of the use of ether or chloroform, and it demands for its administration

far less time and trouble than either of these. It is suited for short operations, and in such is quite as effective as either of the more commonly used anæsthetics.

Nitrous oxide may now be procured from any dental dépôt, condensed as a fluid in iron bottles. The bottles are made to fit in a neat case, which is by no means an unsightly object in the consulting-room, and the gas can be drawn by turning a screw. Neither patient nor apparatus require any preliminary preparation, and everything is ready as soon as the patient is seated in the operating chair.

My own experience in the employment of this anæsthetic has been very satisfactory. Operations in ophthalmic surgery are, for the most part, short, and they may be generally performed in the consulting-room of the surgeon. Hence the anæsthetic can always be at hand, and no time need be lost in preparing for its administration. Some of these short operations, such as upon the nasal duct and the eyelids, notwithstanding they are exceedingly painful, are usually, because of their brevity, performed without an anæsthetic, and delicate and highly sensitive patients are constantly required to submit to these unmitigated hurts and are charged not to complain of pain. All such short operations can be performed under the influence of gas, and in no case is there necessarily a loss of more than one minute of time in using the gas, and, as a rule, time will be actually saved. The patient, seated in the operating chair, takes a dozen or more inhalations of the gas,[1] the short operation is performed; the influence of the anæsthetic disappears, and the patient, who would otherwise have been a sufferer, arises from the chair unhurt, all perhaps in the space of less than two minutes.

But the gas is equally effective in nicer and more compli-

[1] Absolute insensibility is not essential, nor is it necessary that gas should be administered to the absolute exclusion of air, inducing deep lividity of the face. I have not observed the excessive hemorrhage, mentioned in the discussion, except where the face had assumed the deep black and blue color. A pale lividity of the upper lip and about the alæ of the nose, will generally indicate a sufficient degree of anæsthesia, and at this stage there is no excessive turgidity of the vessels of the face. G. T. S. January, 1884.

cated operations. Iridectomy, sclerotomy, tenotomy of the ocular muscles, and other operations, can be performed with infinitely less trouble than when ether or chloroform is used, and with as effective anæsthesia.

In tenotomy of muscles the gas has also the great advantage that the patient is able to use the eye at once, and the surgeon is in position to determine the result of his operation. I have on several occasions performed enucleation of the eyeball, using this anæsthetic, and have in only a single instance encountered any resistance on the part of the patient, and that of no serious character.

It may be doubted whether we can always be assured of the absolute passivity necessary in extraction of cataract from the use of laughing-gas, and it is probable that its employment is less desirable in this than in most other operations about the eye.

In brief, my experience has led me to the conviction that nitrous oxide may be employed with advantage in many operations about the eyes. Its use is attended with scarcely any of the inconveniences common to ether or chloroform, it is clean, it does not unfit the patient for immediate examination after operations, it is safe, and instead of requiring a large sacrifice of time on the part of the surgeon often saves time by enabling him to complete operations more rapidly.

REMARKS.

DR. STRAWBRIDGE asked if any mental hallucinations followed the administration of nitrous oxide.

DR. STEVENS replied that he has observed none.

DR. STRAWBRIDGE remarked that one of the prominent dentists in Philadelphia had been so impressed with the effects of the gas in this direction that he had absolutely refused to advise his patients to take it.

THE PRESIDENT used the gas many times during the past ten years and thought it had the advantages claimed for it to a certain extent. There were two features with reference to its administration, however, which had struck him as peculiar and worthy of notice: First, there is apt to be considerable rigidity on the part of the patient in some instances; second, it is apt to be attended with a great deal of venous conges-

tion, which gives rise to considerable hemorrhage in wounds about the eye.

DR. WEBSTER had seen one case in which the head moved almost constantly, and asked if this usually occurred after the use of nitrous oxide.

The PRESIDENT (in answer) said that it did not always occur.

DR. BULLER said the gas was given for some time at Moorfields, and it was thought strabismus and some other operations could be performed successfully, and several surgeons tried it, but it had been abandoned, and particularly because of the venous congestion produced, and besides that it was difficult to get the patient sufficiently quiet. He was certain that gas, given as it had been done in London, will not keep the patient sufficiently quiet to perform a cataract operation or an iridectomy. He had employed ether, allowing the patient to take it in quantities just sufficient to produce the first stage of anæsthesia, and for this purpose he had not found that over half an ounce was necessary to put them to sleep. With this primary anæsthesia he had been able to perform many little operations. The patient wakes up as soon as the operation is completed, and no inconvenience follows.

DR. R. H. DERBY referred to a case in which iridectomy was performed in a gouty subject suffering from extensive renal disease, in which a small quantity of nitrous oxide was first administered and the anæsthesia thus produced was prolonged by the use of ether, and it acted very favorably.

DR. STEVENS said that in the administration of gas much depends upon its purity, and it is possible that failures may have been due to impurities.

A CONTRIBUTION TO THE OPERATIVE TREATMENT OF GLAUCOMA.

BY ALBERT G. HEYL, M.D.,

PHILADELPHIA, PA.

NOT a more brilliant example of the value of the empirical treatment of disease is on record than the history of the application of the iridectomy to the treatment of glaucoma. Originating in what was doubtless the false interpretation of a keen clinical observation, applied to a disease which even to-day is an unsolved problem, acting in a way which Von Graefe himself could not explain, and which as yet lacks satisfactory explanation, it nevertheless, after twenty years of service, is the main resource in glaucoma. Of course, an operation with such a record must have substantial merit; by this, however, is not meant that the status of the glaucoma iridectomy as a remedial measure is fixed; this can never be until we understand the rationale of its action and the nature of the disease against which it is used. The practical consequence must be that cases present themselves for treatment where the iridectomy is performed, not because we are persuaded that it is the best *possible* procedure for the patient, but because we know of nothing better. It is a matter therefore of practical importance to enlarge our knowledge of the disease, and as a contribution I bring the record of an operative experience from my clinical work of the past year. About eleven months ago there came under my care at the Episcopal Hospital a man aged fifty-one, with the following history: Three and a quarter years ago he was seized during the night with pain in the right eye. Eyeball became red. Sight dimmed. The case drifted along for fifteen months without treatment, when he fell into the care of a specialist,

who recognized the case as one of chronic glaucoma, and for the relief of pain performed an iridectomy; the relief of pain was immediate, but two days after the operation hemorrhage occurred into the anterior chamber, violent pain developed, and under consultation with me, enucleation was proposed and performed.

Two years succeeding the enucleation he noticed a dimness coming over the left eye, without pain or redness in the eyeball; but two weeks after this was noticed violent pain set in; sight was reduced to seeing motion of hand, eyeball became red. He was treated for this apparently on an antiphlogistic plan, but obtained relief only when powders containing some hypnotic were given; then eserine was employed with the effect of bringing the vision to $\frac{18}{100}$. When he came under my care, about three months after the inception of the attack, the condition was as follows: Field very defective above and below, nasal half absent. V. $= \frac{18}{100}$, glaucomatous excavation of nerve, rigid pupil, turgid conjunctival veins; also a small turgid vein running parallel to the sclero-corneal junction, doubtless belonging to the ciliary system, was noted. Knowing the result of the operation on the other eye, which I attributed not to fault on the part of the operator, but to some peculiarity in the case which made the patient liable to intra-ocular hemorrhage; furthermore, making an observation in the fundus which I thought gave me a clue to the nature of the case, and my own views on the subject of glaucoma having been somewhat modified, I determined to make an effort to save the eye in some other way than by the iridectomy. Various internal remedies were first tried. No permanent result was accomplished in this way; the pathological change in the ocular circulation was obvious enough, but its explanation was not easily found. The selection of drugs to produce given effect was difficult, because of the obscurity which envelops their actual physiological action. The study of the physiology of the normal motor apparatus of the blood was further required, a very complex and difficult subject. So that in spite of all that done, the field of vision began to assume a slit-like form, central fixation to be impaired,

V.=$\frac{12}{200}$. It became evident something in the way of operative procedure must be done. I propose to precede the description of the operations performed in this case by a brief description of the vascular phenomena observed in the fundus, and by some formulated statements explanatory of them, in order that the idea of the operative procedure may be comprehended. The vascular phenomena observed in the fundus were these:

1. The narrow condition of the retinal arteries up to the sclerotic ring. This is a well recognized symptom in certain cases of glaucoma.

2. The relative large calibre of the trunk and two divisions of the arteria centralis retinæ lying in the excavation. This in my opinion was not an optical illusion, but due to actual dilatation or abnormal increase in calibre.

3. At the junction of the two radicles which formed the main upper vein there was an enlargement; instead of the two blood currents uniting with well defined angles, the points of junction were rounded, giving rise to a triangular accumulation of blood. The same cause which gave rise to the turgid retinal veins doubtless gave rise to this accumulation. There was then a vascular abnormality consisting of narrow retinal arteries except the disk portions, which were enlarged and pulsating, turgid retinal veins in which the current was extremely slow—so slow as to allow of its accumulation in a favorable locality. If now it can be shown that the same phenomena existed, at least in several other branches of the ophthalmic, and probably in all, we certainly have a very important clue to the nature of this case of glaucoma. This can, I think, be shown beyond reasonable doubt. The next thing is to find the explanation of these phenomena. To make my rationale plain it will be necessary to allude to some of the phenomena connected with the movement of the blood.

1. If we examine the flow of fluid through a rigid or elastic pipe, we may observe two things: (*a*) The fluid has tendency to escape from the orifice of the pipe with a given velocity. (*b*) It likewise has a tendency to burst through the walls of the pipe. The same things have been observed in the arte-

rial system, and hence we have the distinction between the velocity of the arterial current and its lateral pressure. The way in which these are regulated is very complex and obscure.

This much, however, is certain, that the muscular coat of the arterioles is a very prominent factor in the process. Precisely how this is accomplished is, I believe, unknown. My own theory is this. I believe that each tissue regulates its own supply of blood, and also so regulates the character of the capillary flow as the nutrition of the tissue-cell demands. Thus, in the retina, if the cells in a given spot demand that the capillary current which carries the nutriment be swifter or slower, they will make it so through the agency of the muscular coat of one or more arterioles. And so the whole of the branches of the central artery, with divisions and subdivisions lying in the retinal tissue, *i.e.*, from the sclerotic ring, is under the immediate control of the retinal cells. From the sclerotic ring toward the heart the remainder of the arteria centralis, composed of its trunk and divisions lying on the papilla, *i.e.*, as far as the sclerotic ring where the retinal tissue commences, is not immediately controlled by the processes of nutrition going on the retina. The result of such a distinction is this : the blood comes onward from the heart into the retinal arteries ; the cells of the retina, through the vasa motor nerves of the part, send a command to the muscular coat of the arteries to contract ; the arteries contract ; the capillary current is slowed, and at the same time an accumulation of blood takes place in the remainder of the central artery, viz., in the trunk and in the portion of the branches lying on the papilla, accompanied by a dilatation or increase in calibre of this portion of the central artery. So that while the retinal arteries up to the sclerotic ring are in a state of systole, the remainder of the arteria centralis is in diastole. This, however, is scarcely momentary in duration when the condition is reversed ; the retinal arteries go into diastole, the remainder of the arteria centralis into systole, and thus we have this to and fro movement in these two physiologically distinct sections of the arteria centralis retinae. The same phe-

nomena, I believe, exist in the other subdivisions of the ophthalmic, or of the intracranial carotid. Both the ophthalmic and internal carotid I include in the same physiological section as the portion of the arteria centralis retinæ from the sclerotic ring to the branch from which it springs. Now, such is the perfection of this mechanism that, under normal circumstances, the arterial current is forced through the retinal arteries in such a way that in ophthalmoscopic examination we notice no special distinction between the movement of the blood current in the disk arterial branches and the continuations in the retina.

Suppose, however, a pathological process impairing the contractility of the intra-cranial carotid, *e.g.*, sclerosis of its walls. Then the usual systole of the vessel, which should follow immediately the systole of the arterioles directly under the control of the tissue, is too slow in taking place; the rhythm is broken, the tissue arterioles remain in systole, the remaining segment of the arterial system in diastole pulsating with each cardiac impulse; engorgement of the eye takes place, and we have all the symptoms of acute inflammatory glaucoma. I think, therefore, that the peculiar vascular phenomena observed in the fundus of my case are simply indicative of a state which involves all the branches or subdivisions of the ophthalmic, and that the real source of the trouble was impairment of the contractile power of the intra-cranial carotid. There are a great many well established facts to substantiate the above theory, but I must reserve them for another occasion, as my object at present is simply to give reason for the operative procedure adopted in this case. As regards the operative treatment of a case of this kind two distinct methods are conceivable.

1. One which would so affect the ocular circulation as that, in spite of the defective contractile power of the intra-cranial carotid, the nutrition of the eyeball might be maintained sufficiently for the purpose of sight. I suppose that this is the way in which the iridectomy acts, although not after the explanation of Exner. Exner assumes that in glaucoma there is increased lateral arterial tension, and that lateral arterial

tension in general is dependent upon the resistance opposed to onward flow of the blood by the narrow calibre of the capillaries. That if we lessen the increased arterial tension by removal of a certain portion of iris capillaries, anastomosis will be set up between arteries which have been deprived of their capillaries and veins by means of vessels of larger calibre than capillaries ; arterial tension will be lessened, the tension of the eyeball decreased, etc. It is impossible for me to do more than notice the two fundamental errors underlying this explanation. It is not true, as experiments show, that the lateral arterial tension is the result of the resistance of the capillaries, and further, so far from glaucomatous tension being indicative of increased arterial tension, there are facts which can hardly be controverted successfully, which go to show that decreased arterial tension is quite compatible with abnormal tension of the eyeball. Thus in my own case, when I opened the supra-orbital artery, as will directly be more fully described, the blood current scarcely flowed at all. From an enlarged conjunctival vein which was pricked on the one occasion scarcely a drop of blood flowed, showing that venous current was almost stagnant. The conclusion to be drawn from this is that increased intra-ocular tension does not always imply increased arterial tension. As I think that the iridectomy was inadmissible in my case so long as anything else offered a fair chance of success, I shall without further delay discuss,

2. A procedure which has for its object the reduction of the work required of the intra-cranial carotid. This is accomplished by isolating from this vessel a certain amount of tissue area which it supplies. This can be done without great difficulty by ligating the fronto-nasal and supra-orbital. Inasmuch as this procedure is novel, and the anatomical descriptions of the books are not sufficiently detailed to guide one in finding these vessels, a few notes bearing on the topography may be in order. The supra-orbital escapes through the supra-orbital foramen, and lies upon the periosteum of the frontal bone. The supra-orbital foramen, therefore, is the point of reference, and all the tissues down to the periosteum

must be divided in order to reach the vessel. The fronto-nasal artery escapes through the superior palpebral ligament and divides immediately into the frontal, which passes into the tissues of the brow, anastomosing with its fellow of the opposite side and also with the supra-orbital, and the nasal branch which passes down the side of the nose. We cannot locate so well the point of emergence through the palpebral ligament as in the case of the supra-orbital. Still, for practical purposes I think the following plan will answer: Find the fronto-nasal suture (the position of which can be readily estimated); conceive of a horizontal line passing through it; take a point midway between the supra-orbital foramen and the frontal suture, *i.e.*, the line of union of the two lateral halves of the frontal bone; let fall a vertical line through this point, and the point of intersection of this vertical line with the horizontal line passing through the fronto-nasal suture, will give about the point of emergence of the fronto-nasal artery. To ligate the vessel the skin and orbicularis must be divided. If the frontal branch alone is to be ligated above the brow, it should be remembered that it does not lie so deep as the supra-orbital, but after dividing the skin and peripheral portion of the orbicularis we are in the layer in which the vessel lies. Were the supra-orbital alone ligated, collateral circulation would be established through the frontal. If the frontal is also ligated, the intra-cranial carotid is cut off from its frontal area and collateral circulation will be established through a subdivision of the external carotid. If the fronto-nasal be ligated, there is also the same side of the nose cut off from the intra-cranial carotid, and a subdivision of the external carotid acts as collateral. Now, suppose the intra-cranial carotid and its subdivisions to possess normal contractility. The stasis induced by these procedures would doubtless be very transient, as the normal circulating apparatus possesses great compensating power.

From the well-known effect of the ligation of arteries there can be no reasonable doubt that the intra-cranial carotid would lessen its calibre, while that of the external carotid would be increased; and, further, if my rationale of action

of intra-cranial carotid in the propulsion of the blood be correct, the amount of work required of it would be lessened. In this case of glaucoma we have to do not only with defective contractility of the intra-cranial carotid, but with a carotid which has been in a dilated abnormal state for months. Doubtless, in a case like this, changes in calibre and progress toward normal propulsion of blood would occur with great slowness. The stasis consequent upon the operation would disappear very slowly also. Hence I believe it would be a good plan first to ligate the fronto-nasal, then to take up the supra-orbital, but before tightening the ligature, to open the vessel and allow an ounce or two of blood to escape to relieve or combat the tendency to stasis.

The operation, as conducted in my case, was an imperfect illustration of the one just described, because the rationale of the case was not at the time so clearly wrought out, and as the urgency of the case did not admit of delay, I was obliged to go somewhat on general principles. I first attempted to ligate the nasal branch of the ophthalmic. I failed because of incorrect ideas of the location of the vessel. I then successfully ligated the supra-orbital. As this procedure was a new one to me, I watched the result before attempting anything further. The primary effect was encouraging, but it did not last; collateral circulation was set up through the frontal, and the condition was really worse than before; there was the same tissue area, but fewer divisions of the ophthalmic to supply it. The condition began to grow rapidly worse. The frontal was then ligated, and thus the tissue area was effectually cut off from the intra-cranial carotid. It is too soon to judge of the ultimate effect of this, although two months have passed since the last operation. It must be remembered that the eye at the time of operation did not give prospect, even had an iridectomy been successfully accomplished, for a brilliant result. There had been for a month a good-sized hole in the iris from disintegration of tissue. The field was contracting to a slit-like form; central fixation impaired. Although vision was apparently $\frac{12}{200}$, yet it was so imperfect that I could not with the blackboard

take a satisfactory field. In other words, I had to do with a partially decayed and rotting eyeball, and to expect the immediate return of good sight under such condition after any procedure was clearly unreasonable.

I shall now record the most important notes made after the operation, and close this paper with a few brief comments.

March 21, 1883.—V. = $\frac{12}{200}$. Motion of hand at thirty feet. The following week the condition varied: sometimes better, sometimes worse.

March 29, 1883.—I attempted to ligate the nasal branch of the fronto-nasal artery. It was unsuccessful owing to my being misled by the position of the point of escape of the frontal artery from the orbit, as represented in Graefe and Saemisch. The incision was made too low, *i.e.*, too near the internal lateral ligament. It should have been made higher—about on a level with a horizontal line passing through the fronto-nasal suture. As it was, although the incision was prolonged along the nose, the artery was not found, and the wound was closed. No ether was given. Eighteen hours after the operation, wound united; stitches removed; slight chemosis in inner half of upper lid; no redness of the ball. If any change in the enlarged conjunctival veins, they are reduced in calibre. Cornea looks hazy; anterior chamber deep, and the pupil, which was wide in the light, readily contracted, in a dark room, one or two millimeters when light from the day by means of the ophthalmoscope thrown on it; details of the fundus scarcely discernible. A mist seemed to exist over the whole fundus; vision, if any change, worse. Sixty hours after the operation, chemosis of the upper lid had extended from the inner half over the whole extent of the lid; lower lid not involved; vision slightly improved; details of fundus clearer.

April 7, 1883.—Condition of the eye about the same as before the attempted ligation of the nasal artery. A hypodermic injection of one-sixth grain of morphia was given, and, with the assistance of Dr. J. Carpenter, resident, I ligated the supra-orbital artery. The incision was made below the brow, and the tissues divided on a grooved direction

until the supra-orbital notch was reached. The vessel was found by passing a strabismus hook under the tissues to the inner side and hooking it up. It was considerably larger in calibre than I expected, being, I estimate, 1.25 to 1.5 mm. in diameter. Possibly the vessel was dilated. A ligature was passed around it and tightened, not sufficiently to occlude the vessel, but enough to enable me to control the hemorrhage when I cut the vessel, should it be excessive. An opening was then made in the vessel between the ligature and the capillary part of the vessel. Some blood flowed, but then ceased. I loosened the ligature, and blood welled out of the artery slowly. In a few moments a distinct pulsation in the fluid filling the wound cavity could be detected. There was no arterial jet. The ligature was tightened, and the flow ceased. I closed the wound. Immediately after the operation the eye was examined. Details of the fundus were dim, but a very violent pulsation of the disk arteries could be seen. 'Before the operation the media were quite clear, and if there were arterial pulsation on the disk, it did not begin to be as violent as after the operation. Radial pulse was 84.

April 8th.—Upper lid œdematous over the whole surface, and purple in color; no increased congestion of the conjunctiva; can with difficulty open the lid. Pupil of medium size; could not examine fundus. Has had no pain in the eyeball. Patient speaks of prickly sensations over the left side of the head.

April 9th.—Swelling increased in the upper lid and extended to the lower; no chemosis of conjunctiva. Eyeball seems practically unchanged so far as external appearances go.

April 10th.—Swelling of lids diminishing; the enlarged conjunctival veins look very much injected, more so than before the operation. No diffuse injection of the conjunctiva. No pain in the ball, but patient speaks of some pain in the socket back of the ball.

April 11th.—Was able to get an imperfect view of the fundus; details dim; main upper vein seems small; the venous enlargement at the junction of the two veins looks as if it had disappeared.

April 12th.—Ligature loose in the wound; pupil is dilated; details of fundus dim. The venous enlargement has certainly disappeared and the main upper vein is of normal size. A decided arterial pulsation could be seen in the disk. Sight about what it was before the operation.

April 14th.—Vision increased to seeing motion of hand to about five feet; pupil is slightly more contracted than at last note; enlarged conjunctival veins small in calibre but after the ophthalmoscopic examination larger. Media quite clear; slight arterial pulse in the excavation. Main upper artery quite traceable from disk toward the equator except for a space of two or three disk diameters from the sclerotic ring; lower main artery traceable to equator; venous enlargement in main upper vein still absent. Light perception slightly improved over that before the operation. No pain in the ball.

April 16th.—Has had some pain starting from the left inner canthus and radiating over the left side of the head, accompanied by a sensation of heat. Sight has varied to-day; sometimes it appears clear, then cloudy, then clear; interior of the same as the last note; a branch of the main upper artery traceable into temporal half of retina.

April 19th.—Vision has increased to detecting motion of hand at thirty feet. Slight tendency to recurrence of venous enlargement in main upper vein; yesterday all day had pain in the eye similar to that he had experienced after abstraction of blood with the Heurteloup leech from left temple.

April 23d.—The enlarged conjunctival veins seem larger than ever. After rather prolonged examination there were blotches of injected venules which emptied into the large veins; in the fundus retinal main upper and lower arteries are increasing in size; enlargement on the main upper vein absent.

April 26th.—Field and vision about same; fundus somewhat hazy. The projection of fundus seems to have changed so that details of fundus seem nearer; the first impression made by the excavation was that it had become shallower. The refraction of the bottom of excavation was about con-

cave, $\frac{1}{2}\frac{1}{4}$ of the edge of the excavation emmetropic. The bends in the vessels as they pass into the excavation seem as pronounced as before. The arterial vessels seem to be developing, *i.e.*, vessels not before visible are traceable. No pain in the eye, but some over the left brow.

April 30th.—Exterior of the eye about the same. Interior not so satisfactory; arteries have become small, almost imperceptible. There is a tendency for the enlargement again to form on the main upper vein; arterial pulsation in excavation. I tested the tension for the first time since the operation; ball hard. Following the testing of the tension details of fundus became dim; arterial pulsation, also marked venous pulsation in the excavation.

May 2d.—Condition of fundus somewhat improved; the enlargement of the main upper vein has disappeared; arteries are still very difficult to follow; an improvement noted in the field, in that he can now project light correctly from the lower half of the retina far toward the equator. He was given internally gtt. iij. of Fowler's solution ter die, but the following day sight having become dimmer it was stopped, and ordered eserine locally. Eserine continued for a week.

May 10th.—Vision not as good. Light perception seriously worse. I stopped the eserine.

May 12th.—Can hardly detect the motion of hand at fourteen feet; ball is hard. Slight indications of enlargement of main upper retinal vein; the arteries slightly more visible.

May 14th.—Vision is worse and about equal to what it was before the ligation of the supra-orbital. Pulsation in the frontal artery can be easily felt.

May 15th.—Enlargement of main upper retinal vein more visible. Met Dr. G. Peirsol in consultation, and after some hesitation it was agreed that the frontal artery should be ligated. My view was that collateral circulation had set up through the frontal artery, and that what good had been accomplished through the ligating of supra-orbital had been neutralized. Patient was not feeling very well; he was somewhat pale and haggard, but there was no time to be lost. I accordingly made the incision over the brow. The vessel

does not lie so deep as the supra-orbital, and it was cut in searching for it. It bled freely, much more so than the supra-orbital. There was no arterial spurt, only pulsating flow of blood. I caught the end with the artery forceps and ligated it. The immediate effect, if any, upon the enlarged conjunctival veins, was that they became smaller. The most marked change was observed with ophthalmoscope. The details of the fundus were so dim that they could not be recognized, except the pulsation of the arteries in the disk, which, perhaps, was more violent than before the operation.

May 16th.—Twenty-three hours after the operation. Patient has been in bed since the operation; passed a restless night. Slight œdema of upper lid near the inner canthus; under stimulus of ophthalmoscopic examination, pupil contracted to about 3 mm. diameter. Interior of eye very hazy. Can detect no details at first, but after looking a while it cleared up, and I could detect the outline of the nerve and the main upper vein, but no more. Pulse normal; has not been feeling well for a day or two, owing to diarrhœa; says there has been a great deal of "working" over the left side of the head, doubtless from the disturbance in the circulation.

May 17th.—Œdema has involved the whole upper lid; felt sick and giddy this morning; was obliged to go to bed. Lips are blue; pulse, 84.

May 18th.—Is better. Has had a good deal of pain over the brow and left side of the head. Has a sensation of something running down over the forehead. The œdema of upper lid is subsiding, but has extended to the lower; and inasmuch as it has a reddish tinge, and there is erysipelas in the ward, it is possible that the patient has had a slight touch of it.

May 23d.—Ligature came away; swelling out of the lids; fundus not yet visible. Tension over the sclera seems about normal.

May 24th.—Details of fundus becoming visible. The main upper vein seen with tolerable distinctness. A violent arterial pulsation seen on the disk, about equal in degree to that seen immediately after ligation of the supra-orbital, and al-

together unusual in this case. It seemed to me, also, that the vein in excavation pulsated; whether it really did so, or was simply moved by the beating artery, I could not tell.

May 26th.—Iris perhaps slightly more contracted; anterior chamber deep; conjunctival veins unchanged; media slightly clearer; arterial pulsation in the disk slight. Main upper and lower arteries traceable from the disk to near the equator bulbi, and seem to be approaching normal size; they are probably larger than I have seen them during my eleven months' observation of the case. The main upper vein probably stands in normal relation, as regards size, to the main upper artery. This morning, at 4 A.M., felt sharp pain in the eyeball, which lasted half an hour. At 8 A.M. there was considerable bleeding from the right nostril. The tinnitus in the right ear unaffected; during the day a great deal of "working" through the head.

May 28th.—Fundus perhaps more clearly seen; arterial pulsation in the excavation very violent. In the main upper vein a movement recognized, probably pulsatile, existing through the whole extent of the vessel, and probably also existing in other retinal veins. Tension is increased; ball feels quite hard; very little pain in it; no epistaxis. A great deal of "working" and prickling sensation over the left frontal region and side of the head; also some giddiness.

May 31st.—Ball softer; tension normal. Fundus much more clearly seen. Pulsation of the disk arteries feeble and irregular. Retinal arteries traceable; the retinal veins have increased in size. The sight, however, did not seem so good. Patient could not detect the motion of the hand so well, and the light perception and projection worse. No epistaxis; no sharp pain; very little sensation of "working."

June 2d.—Is uncertain whether he can detect the motion of the hand beyond five feet. Light perception and projection slightly improved over the last examination. General appearance of the eye is encouraging; anterior chamber deep. Iris not any more dilated; under light stimulus it contracts, I think, with perceptible motion. Media quite clear. Retinal arteries thin, but traceable from sclerotic ring

to periphery; lower main retinal artery pulsates in the retina. Slight pulsation of the disk arteries. Tension, on slight touch, feels normal; on stronger pressure there is an abnormal sensation of hardness.

June 6th.—Condition unchanged.

June 7th.—Anterior chamber rather shallower; media not quite so clear. Arterial pulse in excavation slightly more pronounced. Tension has again increased. Light perception has improved; he thinks he sees better. Since last note there has been considerable working all around the head; last evening slight epistaxis from right nostril; for the last week the tinnitus in right ear has diminished perceptibly.

June 11th.—Media clearer than I have noted since the operation. Pulsation in one of the radicles of the main upper vein. Tension of ball normal. After I left him on the 7th inst. slight bleeding from the right nostril. On the morning of the 8th inst. slight bleeding from the left nostril, and in the afternoon profuse bleeding from the same. Previous to at least one of these hemorrhages a great deal of "working," he thinks, inside of the head; has also been some giddiness. If any change in the vision it is not so good. The arterial pulsation in the excavation varies; at times very feeble, even perhaps quiescent, then it becomes momentarily quite active. He has been taking tincture of iron for some time, and to eliminate this as a cause of the epistaxis, it was stopped.

June 14th.—Some improvement in the light perception in the upper half of the field. Motion of hand at two feet. Slight mistiness of the fundus; the details of fundus seem more as if some change had occurred difficult to define; perhaps the projection of the fundus has changed. A very feeble disk arterial pulsation. Upper main artery apparently double the calibre that it heretofore has exhibited. The venous enlargement at the junction of the two radicles of the main upper vein has nearly disappeared. Tension slightly above normal. To-day and yesterday a sensation of warmth noticed over the left brow.

June 18th.—A few drops of blood from the right nostril since last observation; anterior chamber of normal depth.

A tendency to staphylomatous protrusion of upper portion of anterior external quadrant of the sclera. Interior of the eye so cloudy that I can barely see the course of the main upper vein. No pain in the eyeball, and has had none.

June 21st.—Fundus more easily seen. Detected floating opacities in the vitreous, a thing not before observed in this case; opacities were apparently black. Disk arteries, slight pulsation. Main upper retinal artery very distinct and about the same calibre as the disk continuation. Vision has increased to detecting motion of hand at six feet. No pain, no epistaxis; slight working over the brow. Tension, if changed, slightly increased over last observation.

June 25th.—External appearances about the same except that one of the branches of an enlarged conjunctival vein has nearly disappeared. Detail of fundus clearly seen. Arterial disk pulsation very feeble. Tension has still further increased; ball is hard. Vision, if altered, slightly better. Pulsation in the branches of temporal artery going toward the brow easily felt.

June 28th.—Arterial branches in the retina, which previously were invisible, are coming into view. Scleral tension is still increased, refraction of the fine vessels crossing the temporal half of the glaucoma halo, = H. $\frac{1}{20}$ to $\frac{1}{24}$.

July 2d.—Ball still as hard as at last observation; no epistaxis; no pain, but a kind of headache accompanied for two or three nights by a blowing sound in the ear.

July 5th.—Head symptoms subsided. A feeling of soreness over the whole frontal region. Has been slight pain in the eyeball. Media clearer than at last examination. Slight disk arterial pulsation, at times difficult to see, and apparently irregular, sometimes giving a pronounced pulsation and then subsiding. Tension has lessened. Vision does not seem so good. Anterior chamber shallower.

July 7th.—No material change, unless that the refraction of fundus seems more myopic; seems to require $-\frac{1}{8}$ to give the details definition.

July 9th.—The branch of the enlarged conjunctival vein, which had become small in calibre, has enlarged again;

light perception a trifle better. Tension is normal. Counts fingers at six feet.

July 11th.—Counts fingers at eight feet. Tension perhaps slightly increased. The enlarged conjunctival veins of small calibre.

July 12th.—Vision not so good; can barely detect motion of hand at six feet. Media clear. Projection of fundus nearer. Refraction of fine vessels on external half of glaucoma halo H. $\frac{1}{4}$s. Very slight pulsation of disk arteries. Venous accumulation on the upper retinal vein absent. Pupil more contracted. Conjunctival veins smaller, as if diminishing in calibre. Scleral tension harder, if changed at all.

July 16th.—Has had an attack of cholera morbus. Has been obliged to go to bed. Tenesmus, nausea, anorexia, headache, and some working over the left temple. No pain in the eye. Vision slightly better; also light perception. Media clear. Arterial disk pulsation could not be detected even with the finger on the radial. Tension normal.

This note is the last made previous to my leaving home to attend the meeting of the Society. The case is still under observation, and doubtless will be some time before the definite result can be known. I may recall the fact that we have to do in this case with an eyeball diseased for a full year; it is in a state of partial decay analogous to the condition known as senile gangrene, but presenting peculiarities of its own by reason of the characteristics of the organ assailed. Granted that we obviate the original cause of the trouble, it is evident that something more is necessary to restore the normal condition of the eyeball. The structural elements must first take on normal activity, and this, if it occur, must require time, and perhaps the discovery of some method of stimulating the cells. I bring this contribution, therefore, not as an account of a successful operative procedure, but rather as a clinical contribution bearing on the etiology and therapeutics of glaucoma. I will close by a brief allusion to some of the many points in the clinical record already given.

1. I shall notice some peculiarities connected with the circulatory apparatus of this eye: (*a*) The trunk of the supra-

orbital was doubtless of abnormal calibre ; the pulse-beat of it scarcely perceptible ; the flow of blood from the opened vessel extremely feeble. These conditions, it seems probable to me, existed likewise in the disk portions of the arteria centralis retinæ, likewise in the trunks of the other divisions and subdivisions of the ophthalmic. (*b*) The flow of blood from the frontal was more free, probably, because it had already acted as the collateral supply to the frontal region. (*c*) The effect of the ligation of both vessels may be divided into that which was produced upon the ocular and orbital circulation and that produced upon the intracranial circulation. The effect upon the ocular and orbital circulation manifested itself immediately after the operation. The enlarged conjunctival veins were not noticeably affected, the main vascular change observable being the very pronounced character of the disk arterial pulsation ; this at least after ligation of supraorbital ; in the case of the frontal the obscuration of the fundus being so great that I could not speak positively about it ; later, when the fundus could be more clearly seen, it was just as pronounced as in the case of the supraorbital. This pronounced pulsation I suppose was due to the local stasis following the ligation, in consequence of which the blood was driven with greater force into the arteria centralis retinæ. The venous enlargement on the main upper vein disappeared after ligation of supraorbital, but recurred again and with its recurrence vision sank rapidly. This was perhaps about the time that the collateral circulation was being established. After ligation of the frontal it again disappeared, but very much more slowly. The effect on the intracranial circulation was as follows : After ligation of supraorbital scarcely any effect was noticed except, about five weeks after the operation, a blowing sound in the right ear. After ligation of the frontal a much more pronounced effect took place and evidently not confined to left side—epistaxis largely from the right nostril, giddiness, cessation of the blowing noise in the right ear.

The occurrence of temporary vitreous clouds was doubtless caused by some change in the intracranial circulatory apparatus. Probably these changes will still occur, as it is evident

the collateral circulation is very slow in being established, and these effects of changes in intracranial circulation showed themselves during a period of some weeks after the operation. This all points to some abnormalities in the intracranial circulation.

All of these observations have an important bearing upon the etiology of glaucoma, as it must be accepted as beyond dispute that in acute inflammatory glaucoma not only does a disturbance of the physiological blood-supply of the eye exist, but also one that is altogether peculiar. To trace the connection at present would take me far beyond the limits of this paper.

2. Let us refer to the cloudings which obscured the details of the fundus. At least two varieties were noticed: (*a*) Those which recurred immediately after the ligations of the arteries. This variety was evidently dependent upon the vascular disturbance set up by the operation. So far as the eye was concerned this would seem to be the result of the more rapid propulsion of blood into a vascular apparatus acting in abnormal manner, and in which the venous stream is very nearly at a standstill. Not only so, but I was able to demonstrate in my case that the propulsion of the blood through certain conjunctival venules was more rapid than through the venous trunk which they formed; the blood in the venules would accumulate and be discharged with considerable rapidity, while in the main trunk very little change would be observed. No doubt the same condition existed in other ocular venules. The effect of a sudden increase in the velocity of the arterial current would be simply to increase the venous stasis. How is such a condition related to the steamy condition of the cornea? I think a well-established fact throws light upon this question. I quote it from Cohnheim:[1] "The lymph-flow from any part of the body is noticeably increased so soon as the escape of venous blood from the same is obstructed. Place a canula in one of the lymph-vessels on the external side of the leg of a dog, and there will flow very little lymph from it, in the

[1] Cohnheim: Allgemeine Pathologie, s. 119.

course of several minutes scarcely a drop. Ligate now the principal veins of the leg, and immediately the lymph begins to drop from the canula with greater rapidity, so that as many cubic centimetres may be collected as drops before the ligature was applied." From all this it seems probable to me that the steamy condition of the cornea is simply caused by an abnormal escape of lymph into the corneal tissue; with the decrease in the venous stasis the corneal clouding would disappear. It is possible that the lens likewise was involved in a similar manner. (*b*) The details of the fundus were likewise obscured by vitreous clouds. This occurred, so far as I am aware, but once. It was of short duration, occurred seven weeks after ligation of the frontal, and at a time when other symptoms showed that intracranial circulatory changes were taking place. These vitreous clouds, as far as could be known from ophthalmoscopic examination, belonged to the same class as those clouds which are not uncommon in myopic eyes of high grade; sudden in inception, unaccompanied by any symptom indicative of an active inflammatory process. I suppose these clouds may be supposed to be the result of stasis in some of the ocular vessels. The coincidence in time of the cerebral vascular disturbance and these vitreous clouds is worthy of note.

3. The effect on the tension. After the immediate effect of the ligation of the supraorbital had passed away and favorable symptoms were developed, a change for the worse occurred, perhaps connected with the establishment of the collateral circulation through the frontal. The ball became very hard at this time. Just before the ligation of the frontal there was a tendency to softening; after this various changes were observed, tension even becoming normal.

If, as I believe, the tension of the eye is intimately connected with the state of the circulation, these various changes are explained.

4. I notice finally the change in the projection of the fundus which occurred. There were times when the fundus of the eye would appear nearer the eye than at others. Every one who is accustomed to observe the distances at which

the fundus details in normal eyes are projected know very well that there is considerable variation even in the eyes of the same refraction. Now in this glaucomatous eye variations of this kind occurred. This must have been due, I think, to some alteration in the position or shape of the crystalline lens. An interesting point in connection with these variations was an apparent change in the depth of the excavation. It would appear shallower, perhaps, were the vessels at the margin of the excavation not so abruptly ended, but more easily followed into the excavation. This was doubtless an illusion depending upon alteration in the projection. Graefe [1] placed on record an observation of this kind, illustrating it with drawings of the disk both before and after the iridectomy. He would draw from them a proof of the dependence of the excavation upon the increased pressure. It does not appear from the record that this matter of change in projection from alteration in position or shape of lens was taken into account, and it seems, therefore, to me that, so far from this correct clinical observation being explained by an actual shallowing of the excavation, it was simply an optical illusion.

REMARKS.

DR. WEBSTER said that while the doctor was relating his case it occurred to him that some years ago, he read an article in some California medical journal, in which the writer advocated ligature of the carotid artery for glaucoma, and that some specialist had performed the operation once and cured his patient.

DR. HEYL said that the application of a ligature to the carotid artery would have an entirely different effect from the operation referred to in his paper. Ligation of the carotid of one side would be followed by dilatation of that on the other, also the vertebral; and when once the collateral circulation is established the ocular blood would go on as before. Were sclerosis of the intracranial vessels present there doubtless would be more or less difficulty in those vessels accommodating themselves to the changed conditions. The operation described in the paper was based on the assumption that the intracranial carotid performed an important function in the

[1] Archiv fur Ophthalmologie, iv., 2, 127.

propulsion of the blood to the tissue which it supplied, that the greater the tissue area the greater the power which the carotid must furnish. Cut off a given area of tissue from it and the less work it will have to perform.

THE PRESIDENT said that the natural history of cases of acute glaucoma must be considered before deciding the influence of such effects upon the circulation as would be produced by the operation suggested by Dr. Heyl.

DR. SEELY said that the California operation and the operation suggested by Dr. Heyl were exactly the reverse.

SOME ADDITIONAL REMARKS ON THE THEORY OF THE ASTIGMATIC PENCIL.

(With Woodcut.)

BY G. HAY, M.D.,
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IN the "Transactions of the American Ophthalmological Society" for 1871, after showing that small astigmatic pencils of straight lines may be conceived in which the focal lines are oblique to the axis of the pencil, I remarked that "the conclusions arrived at by means of the formulæ given by Knapp, that there may be two focal lines each perpendicular to the axis, are subject to certain conditions: First, the algebraic expressions for the distances of the focal lines from the origin must have *real* values, and not be imaginary" (that they might be imaginary was stated in Knapp's article, *A. f. O.*, 1862). "Second, the equations [1] must exactly represent the pencil."

Before considering these two conditions, it may be well to discuss somewhat equations [1] namely:

$$x_1 = Ax_0 + By_0$$
$$y_1 = Cx_0 + Dy_0$$

It has been shown (see *Archives of Ophth. and Otol.*, vol. ii., p. 79) that if

$$B = 0$$

and

$$C = 0$$

the focal lines will be rectangular, each to the axis of the pencil, and to each other.

If

$$B = C$$

we can reduce the case to the preceding by changing the coordinate axes.

If

$$B = O$$

and C is not zero,

we shall have a pencil in which the two focal lines are perpendicular, each to the axis, but not to each other.

To show this : Let the notation be as in the *Archives of Ophth. and Otol.*, vol. v., p. 497. Then for any ray of a pencil we have the equations

$$x = x_o + z(x_1 - x_o)$$
$$y = y_o + z(y_1 - y_o)$$

If now, making B equal to zero, we put in these equations

$$x_1 = Ax_o$$
$$y_1 = Cx_o + Dy_o$$

we have

$$x = [z(A - 1) + 1]\, x_o \qquad [2]$$
$$y = [z(D - 1) + 1]\, y_o + zCx_o \qquad [3]$$

If we put

$$z = -\frac{1}{A - 1}$$

then by [2] and [3]

$$x = o$$
$$y = -\frac{C}{A - 1} x_o + \left[1 - \frac{D - 1}{A - 1}\right] y_o$$

that is, for every ray of the pencil there is a point, whose coordinates are

$$z = \frac{1}{A - 1}$$
$$x = o$$

and the corresponding value of y. The locus of these points is a focal line in the co-ordinate plane Y Z, and perpendicular to the co-ordinate axis Z, at the distance $-\frac{1}{A-1}$ from the origin.

Again, if

$$z = -\frac{1}{D-1}$$

then by [2] and [3]

$$y = -\frac{Cx}{D-1}$$

$$x = x_0 \frac{D-A}{D-1}$$

$$\frac{y}{x} = -\frac{C}{D-A}$$

That is, for the point in each ray, whose co-ordinate z is $-\frac{1}{D-1}$, the corresponding x and y have a constant ratio to each other; the locus of such points is a straight line in a plane perpendicular to the co-ordinate axis Z at distance $-\frac{1}{D-1}$ and intersecting this axis.

Such locus is a focal line in a plane perpendicular to the axis of the pencil and not at right angles to the other focal line, as C is not zero.

If B and C are unequal and neither is zero, and if

$$-4BC < (A-D)^2$$

or if

$$-4BC = (A-D)^2$$

it may be shown by changing the co-ordinate axes that the two focal lines will be as in the case just considered.

To come back to the principal object of this communication, let us consider the first of the two conditions mentioned above, namely: that the distances of the focal lines from the origin must have real values. We find that these distances will be imaginary if we have

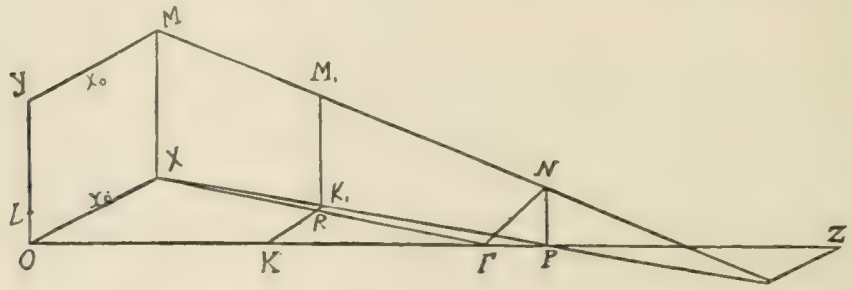
$$-4BC > (A-D)^2 \qquad [4]$$

that is, if B is not zero, and if C is not zero; and if B and C are of contrary signs and of such values that the inequality [4] holds. In this case equations [1] do not, by Kirchoff's method, as given by Knapp (*A. f. O.*, 1862), show any focal line at right angles to the axis.

The inequality [4] will be satisfied by the values,

$$A = 1$$
$$D = 1$$
$$C = 1$$
$$B = -1$$

If with these values we consider the annular pencil consisting of the rays intersecting the plane $X_o Y_o$, each at the distance r from the origin, the section of this pencil perpendicu-



lar to the axis will be everywhere a circumference of a circle which becomes larger as it is more distant from the origin, and in which there can be no focal line, oblique or perpendicular, to the axis.

In fact, this annular pencil will be a hyperboloid of revolution generated by the rotation of the hyperbola, with semi-conjugate axis unity and semi-transverse axis r around its conjugate axis; this latter may be considered the axis of the pencil.

As to the condition that the equations [1] should exactly represent the pencil, this is not always the case.

If we take rectangular axes and the focal lines as shown in the figure, in which F N represents an oblique focal line in plane Y Z, we shall find that the pencil which passes from the neighborhood of O toward Z, and each ray of which intersects the focal line F N, and another focal line parallel to

O X, and intersecting O Z (O Z being the axis of the pencil), is not subject to equations [1].

For, in the first place in this case, as all the rays of the pencil which intersect O Y remain in the plane Y Z, we shall have for any ray intersecting the axis O Y at a short distance above the origin, say at L,

$$x_0 = 0$$
$$x_1 = 0,$$

then for this ray by the first of equations [1],

$$x_1 = 0 = By_0,$$

and as y_0 is not zero,

$$B = 0,$$

and as B is a constant, the first of equations [1] becomes for this pencil

$$x_1 = A\, x_0 \qquad [5]$$

This last equation, however, is not true for this pencil, as we see by the figure, in which

O X, O Y, O Z are three rectangular co-ordinate axes.
O Z is also the axis of the pencil.
M is in plane Y X.
M X and M_1 K_1 are each perpendicular to plane X Z.
K_1 K is in plane X Z, and perpendicular to O Z.
O K is unity.
M Y = O X, that is, x_0 for the ray M M_1 is equal to x_0 for the ray X F, but
K K_1 = x_1 for the ray M M_1
R K = x_1 for the ray X F.

Then $\frac{x_1}{x_0}$ is not constant for this particular pencil. Consequently, equation [5] does not hold for this pencil; that is, equations [1] do not both hold for this pencil.

REMARKS.

DR. KNAPP, of New York, said that Dr. Hay had ascribed the development of this general formula to him, which was not the case. In the paper to which Dr. Hay had referred he distinctly stated that the development of the general formula was by Professor G. Kirschoff, who had had the kindness to give it him in manuscript. Dr. Knapp had applied it to the human eye according to his own measurements. Dr. Knapp said Dr. Hay made the statement that it can be imagined that the focal lines may at times not be at right angles with each other, but only at right angles with the visual line. This statement is against all our practical data. He only remembered, when studying the subject, that it was stated in all the books to which he had access that the focal lines in any symmetrical surface must be at right angles with each other. He thought there were only one or two books where it was stated that they may not be at right angles, but that these were not the best authorities. He asked Dr. Hay if he could demonstrate that they cannot be otherwise.

DR. HAY said his paper referred to pencils of straight lines, and that, as he understood it from the analysis of pencils of straight lines which Dr. Knapp gave in 1862, it was possible that the focal lines might be at right angles with the axis of the pencil, and not at right angles with each other. (See *Archiv. Ophth. et Otol.*, ii., 1, 80.)

Dr. Hay distinguished between a physical pencil of light and a geometrical pencil of straight lines. But as a physical pencil of light he thought the case does occur where one of the focal lines is oblique to the axis. If you take a bi-convex lens and suppose a peripheric small pencil coming along parallel to the axis of the lens, and striking the lens toward its periphery, we know that its rays will come down and meet the axis of the lens, and the more peripheric rays will meet the axis nearer to the lens, and so a small portion of the axis of the lens will be a focal line of the refracted pencil, and oblique to the axis of this refracted pencil.

DR. KNAPP said that we sometimes get better results in mixed astigmatism by using a convex and a concave cylinder, thereby making one meridian emmetropic and correcting the astigmatism for the other. The reason for that may be that the mathematical formula strictly applies only to a pencil of rays of an infinitesimally small aperture, whereas the pupil

formed a diaphragm of from two to four millimetres in diameter.

THE PRESIDENT said he had noticed that fact and he was also acquainted with the use of two cylinders at right angles; another fact that the field is flatter in mixed astigmatism, with considerable astigmatic error, there is better correction for the peripheral part by employing a bi-cylindric glass than there is when spherico-cylindrical glasses are used in the usual manner.

DR. KNAPP said there was another point which had puzzled him, he had sometimes found that when he had corrected myopic astigmatism with cylindrical and spherical glasses as well as possible, the glasses held vertically before the eyes, the patients obtained a greater acuteness of vision by looking obliquely through a concave spherical glass. Mostly it was the upper outer edge of the spherical they were looking through, and obtained thus a sharpness of sight greater than he had been able to give them by any combinations of spherocylindricals.

DR. HAY thought that as both meridians became stronger (though in different degrees) that the result is equivalent to a stronger spherical glass + a cylindrical glass. Possibly the improvement in vision may be due in part to the stronger glass.

DR. KNAPP said that increase of the strength of the glasses had not improved vision to the degree the patient acquired by looking through the edge.

DR. HAY continued: Usually the formulæ refer to small pencils, which are easier to study; but the consideration of larger pencils is more difficult.

DR. MCKAY said, concerning looking above or below the centre of the lens giving better vision, that he had met with quite a number of those cases, in which he continued to persevere with trial glasses until he obtained correction by which that effort was overcome entirely and the patients would see best through the centre of the glass. He thought one of the cases was seen by Dr. Thomson; at all events he derived great benefit from reading what Dr. Thomson had written on the subject, and thought the Society would be interested could he be induced to speak.

THE PRESIDENT called upon Dr. Thomson, of Philadelphia, who said that the case alluded to by Dr. McKay was one of conical cornea. He thought that the difficulty in many of the cases we meet with arises from the fact that in some cases of astigmatism there is an amount of divergence at the apex of

the cornea, which cannot (?) be corrected. He was inclined to think so because in that case and in others, by producing slight displacement of the head, the patients find a place where they see best. He had found cases in which he had been obliged to correct for the periphery, and leave the centre uncorrected.

DR. MITTENDORF, of New York, said that, for the same reason mentioned, he thought any mechanical arrangement for determining the nature of astigmatism, such as the astigmometer or the eye meter, for holding the glasses in front of the eye, did not prove so satisfactory as holding the glasses with the fingers.

THE PRESIDENT asked a question in connection with cases of conical cornea, and it was whether any of the members had had experience in the use of hyperboloid lenses. He had tried them in several instances and had not found them of value.

DR. KNAPP said he had not used them.

DR. HAY thought he obtained with the best hyperboloid lenses about the same vision which in the case of one eye had been obtained with spherico-cylinders, and it was much easier to make the correction. He referred to a case seen by Dr. Noyes and himself.

THE PRESIDENT said that the patient subsequently regarded the hyperboloid lenses as of no particular value to him.

FOUR CASES OF SARCOMA OF THE UVEAL TRACT.

(*With Woodcut.*)

By CHARLES J. KIPP, M.D.,

NEWARK, N. J.

CASE I. *Melano-Sarcoma of Ciliary Body and Adjacent Choroid and Iris.*—Mrs. H. H., of American birth, seventy years of age, was first seen July 3, 1882. Is in pretty good health. Is not aware that the eye about which she wishes advice has ever been injured. The right eye is apparently normal in every respect; the left eye has been blind for six months. There is not now, and there never has been, any pain in the eye itself. Occasionally she has had a "drawing" pain about the eye. On examination of the left (blind) eye, the anterior parts were found to be healthy; there were no signs of irritation; pupil was of medium size; the lens was not very clear. After dilating the pupil with atropine, examination with oblique illumination showed, not far behind lens, in temporal half of vitreous chamber, a large *yellowish-white mass* of nearly round form, on the anterior surface of which were a number of small red patches (hemorrhages). On nasal side the retina seemed detached and floating about. The eye could not be illuminated with ophthalmoscope; the eye was totally blind. Tn. The mobility of the eye was unimpaired in every direction. Enucleation of globe was advised but not accepted.

Six weeks later the patient returned with the statement that she had suffered very great pain ever since her visit to me. There was now great chemosis and injection of the whole ocular conjunctiva. The swelling around the cornea was so great that the cornea was almost hidden by it; the

cornea was steamy. The anterior chamber was very shallow and the pupil very widely dilated. T. +2.

The eye was enucleated on following day and the wound healed kindly and rapidly. Six weeks later there was no relapse.

On opening the eye two-thirds of the vitreous chamber was found to be occupied by a round tumor, of a dark color, which sprang from the ciliary body and the anterior part of the choroid. The anterior surface of the tumor was loosely covered by the thickened and opaque retina. After the tumor had been hardened it was examined microscopically and was found to be made up of large spindle-shaped cells, many of which contained pigment. There was scarcely any intercellular substance. Numerous blood-vessels and many free masses of pigment were found all through the tumor. The retina had undergone connective-tissue degeneration. The base of the tumor was in close contact with the sclerotic throughout, and in several places the inner layer of the sclerotic only was invaded by round and oval cells. The iris adjoining the tumor was much thickened by the infiltration of round and oval cells.

CASE II. *Melano-Sarcoma of Choroid in an Eye which Twenty Years before had Suffered from Chorio-Retinitis.*— W. P. R., American, thirty-four years of age, was first seen at Newark Charitable Eye and Ear Infirmary, August 21, 1882. With the exception of an ozæna was in good health. States that twenty years ago he had a severe eye trouble, since which time his vision has been somewhat impaired in both, but more especially in the left eye. Since two months he has noticed gradual failure of sight in the right, which formerly was his best eye. The eye has not been injured. It is emmetropic, S. $\frac{5}{36}$. The visual field was defective in outer half and much contracted in all other directions. Tn. On examination nothing abnormal was detected in anterior half of eye; the media were perfectly clear. On looking into the vitreous chamber after the pupil was dilated the attention was at once arrested by a semi-globular tumor which nearly filled the nasal half of the chamber. The most projecting part of

the tumor reached nearly the visual axis of the eye. The surface of the tumor was perfectly smooth and of a yellowish-red, mottled appearance; it was covered by the transparent retina, the vessels of which could be readily distinguished from those of the tumor. With the exception of a slight detachment at the base of the tumor, the retina was in its place. The optic disk was white and opaque and its margin was slightly blurred; the vessels were very thin. A little below the disk there was an atropic patch in the choroid.

The left eye showed a white opaque disk, small retinal vessels, numerous small atrophic spots in choroid, especially at periphery, and numerous pigment deposits of irregular form in different parts of the retina, S. $\frac{5}{5}$. Field concentrically contracted. Hemeralopia.

Although the sight of the right eye was still tolerably good, I advised immediate enucleation of this eye, which advice the patient declined to follow.

On May 12, 1883, I saw the patient again. He was now nearly frantic with pain in the right eye and the whole head. His eye presented the appearance of an acute inflammatory glaucoma. The media were so turbid that the interior of the eye could not be illuminated. T.+2.

I enucleated the eye on the same day; the wound healed rapidly. Up to date there are no signs of a relapse.

The eye was opened immediately after enucleation, and presented the following appearance: Retina detached in the form of a funnel. On nasal side a large dark tumor of irregular form, which was attached to choroid by a moderately broad base. In the choroid, especially at periphery, were many spots of much lighter color than the rest of this membrane. The microscopical examination of the tumor showed it to be made up of small spindle-shaped cells, very few of which contained pigment. The tumor was very vascular and contained many free masses of pigment. The tumor probably originated in the outer layer of the choroid, as the chorio capillaris could be more or less distinctly made out in different parts of the tumor. The base of the tumor was in close con-

tact with the sclerotic, which was, however, free from sarcomatous elements.

CASE III. *Sarcoma of Choroid, originating in the Region of the Macula.*—Mrs. I., American, forty-one years of age, a large, healthy-looking woman, consulted me for the first time February 12, 1882. Loss of sight of right eye was her only complaint. Impairment of vision was first noticed a year ago, but located in right eye by accidental closing of the left only three months ago. There was no pain; the eye had not been injured.

The anterior half of eye presented nothing abnormal. Refractive media were perfectly clear. The only abnormity visible was an opacity and a projection of the retina in the region of the macula. The retina was of a grayish hue over a round space equal to perhaps three diameters of the disk. At the periphery of this space the grayish tint gradually faded. Running horizontally across this space were several lines of somewhat lighter color, which did not, however, change their places with movements of the eye. The retinal vessels were of normal number and regularly distributed. They were uncommonly distinct in the opaque retina. The summit of the protuberance was best seen with a + 4 dioptrics glass, while the rest of the fundus was best seen without a convex glass by the emmetropic eye. The sides of the elevation sloped gradually to the normal level. No fluid could be discovered behind the opaque retina, and there were no signs of a cysticercus. The remainder of the retina was entirely normal, and the choroid was apparently healthy. The disk was normal. There was a large central scotoma corresponding to the opaque area in the retina. Peripheral vision was about the same as in the other (good) eye. TH.

I suspected a choroidal tumor, and so informed my associates at the Infirmary, but did not inform the patient of my suspicions. She was kept under observation for several months, during which time she took considerable quantities of the iodide of potassium, which greatly relieved her headaches but had no appreciable effect on the eye. As she did not improve under treatment, she discontinued her visits to me

in May of the same year. During the three months she was under observation I examined the eye carefully about once a week, but was not able to discover at any time a change in the eye.

About fifteen months after her last visit she called on me again. She had then been suffering great pain in eye and head for several weeks. The eye presented the ordinary symptoms of acute inflammatory glaucoma. T. + 2. I enucleated the eye July 8, 1883. The operation was performed in the usual way, and the wound healed in six days.

The eye was divided by a horizontal section. The retina was detached everywhere, except at the optic nerve entrance and at region of ora serrata. A large tumor, dark in color, and irregularly pyramidal in form, was connected with choroid from the optic nerve entrance to the equator. It consisted of spindle-shaped cells, and contained but little pigment. It probably started from the outer layer of the choroid, as the chorio capillaris was tolerably well preserved in many parts of the surface of the tumor. Although in contact with the sclerotic over a large space, no sarcomatous cells were found in this membrane.

In a paper on the "Diagnosis of Intra-ocular Sarcomata,"[1] Becker says: "Choroidal sarcomata originating in the region of the macula seem from the very beginning to have but little disposition to proliferate in the interior of the eye, but are prone to develop posteriorly in the orbit." That this does not always occur is proved by the above case.

CASE IV. *Melano-Sarcoma of Ciliary Body and Iris.*— Mrs. C. D., a healthy-looking woman, forty-two years of age, consulted me for the first time in August, 1875, for the purpose of obtaining relief from great pain in her left eye. According to her statement, this eye had never been injured and its sight was good till a few months ago, when she accidentally noticed that she was unable to recognize large objects with it. Up to a fortnight before she came to me the eye had never been uneasy, but since then she has suffered

[1] Archives of Ophthalmology and Otology, vol. i., page 694.

very much from pain in and about the eye. On examination it was found that she had only perception of light. The tension was markedly increased (T. + 2). The lids were healthy. The eye was of normal size and form, and its mobility was unimpaired. The conjunctiva was healthy. Around the cornea was a zone of enlarged subconjunctival veins, several of which pierced the sclerotic about 3 mm. from cornea. The cornea was normal, the anterior chamber of normal depth, and the aqueous quite clear. The pupil was widely dilated and almost immovable.

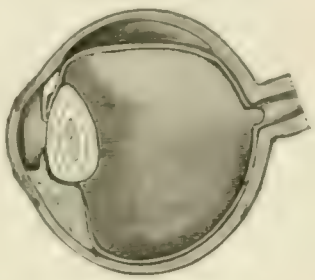
On looking at the iris, attention was at once attracted to the middle part of the temporal half, which was swollen and of a dark slate color. This swelling extended about two millimetres above and below the horizontal meridian, and from the periphery to within 1 mm. of the pupillary margin. The anterior surface of the swelling was in contact with Descemet's membrane. The remaining part of the iris was of same color as the other eye, and of normal texture. The lens was transparent, and apparently in its proper place. The vitreous body was somewhat hazy. The fundus oculi presented the usual appearances of chronic inflammatory glaucoma, viz., a kettle-form excavation reaching to the margin of the disk, distention and tortuosity of the retinal veins, and spontaneous pulsation of the arteries on the papilla. The choroid was normal. When the eye was abducted as far as possible, an indistinct, circumscribed, dark, reflex was obtained from the outer ciliary region, on a line with the swelling of the iris. With the oblique illumination a similar reflex was observed in the same position.

Believing the case to be one of sarcoma of the iris and ciliary body, with secondary glaucoma, I advised the enucleation of the eyeball, and performed the operation in the usual manner three days later. The wound healed by first intention, and four days after the operation the patient was discharged from the hospital. Nearly nine years have now passed since the eye was removed, and as yet there are no signs of a relapse. The patient is in good general health.

An examination of the eyeball by transmitted sunlight, im-

mediately after the operation, showed it to be perfectly transparent, except at the outer ciliary region, where a dark mass was seen to project toward the axis of the eye.

The eye was hardened in Müller's fluid, and opened by a section passing through the middle of the tumor. The cornea and sclera were apparently normal. In contact with the inner surface of the cornea and sclera, on the temporal side of the eye, was seen a growth of irregular form, occupying the place of the ciliary body and extending into the anterior chamber. This growth extended backward to the junction of the ciliary body and the choroid, and anteriorly about three millimetres into the anterior chamber; it occupies about eight millimetres of the circumference of the ciliary body, and measures at its most projecting point (immediately posterior to the equator of the lens) about four millimetres in thickness. Its posterior surface is convex, of a dark color, and closely covered by the membrana ciliaris retinæ. After the removal of the latter it is seen that whilst on the middle portion of the posterior surface the ciliary processes had entirely disappeared in the growth, they were preserved near the margins of the tumor. In its forward growth the tumor had detached the iris from its connection with the cornea for a space measuring about six millimetres in width, so that the iris appeared to grow out of the tumor. The iris itself was greatly swollen when it was in immediate connection with the tumor, but in every other part it appeared normal. Of the zonula zinnii, the part in contact with the tumor had almost entirely disappeared, probably by atrophy from pressure. The lens was perfectly transparent, and in its proper place, but its form has undergone a change in such a way that the antero-posterior diameter of the outer half was increased at the expense of its equatorial diameter. The nasal half of the lens was apparently of normal curvature. The vitreous body showed no abnormity. The ciliary body appeared healthy outside of the region occupied by the



tumor. The choroid and retina were in normal position, and showed no abnormity. The optic papilla was deeply excavated.

The microscopic examination showed the growth to be a very vascular melano-sarcoma, which had probably originated in the inter-muscular conjunctive tissue of the ciliary muscle, and subsequently invaded the iris.

REMARKS.

DR. MITTENDORF asked Dr. Kipp if he had seen metastatic sarcoma of the choroid?

DR. KIPP replied that he had not.

THE PRESIDENT remarked that in relation to these tumors of the choroid, there was a point which might deserve consideration, that is, under what circumstances the tension might be increased or diminished, or the eye remain normal. The clinical history in such cases in this particular is very vague, and we can scarcely predict when that condition may be expected to arise.

CASE OF OSSIFICATION OF THE CHOROID.

By CHARLES J. KIPP, M.D.,

NEWARK, N. J.

THE eye was removed from a young man, twenty-two years of age, who was first seen ten years before the eye was enucleated. At that time the eye was free from all signs of irritation. There was an adherent chalky cataract, which, according to statements of the child's parents, was first noticed by them shortly after birth. The iris was atrophic. The eye diverged, and had but imperfect perception of light. As the case was hopeless so far as the restoration of sight was concerned no treatment was advised.

Ten years later the patient was seen again. He was now suffering great pain in the eye. There was much circumcorneal injection. The cornea was clear, the anterior chamber of normal dimensions, and the aqueous clear. The iris

was much bulged forward in its central portion, while the pupillary margin was completely fastened to the anterior capsule and the periphery of the iris was retracted. The pupil was very small, and of the form of a crater. The cataract was as before. The anterior upper ciliary region felt soft to the touch, while at every other part the sclerotic was very hard. The eye was enucleated in the usual way, and the wound healed kindly and quickly.

Examination of the eye showed a very thick deposit of a hard substance (bone) over the whole inner surface of the choroid, reaching to the ciliary body. The bony capsule was perforated at the optic nerve entrance. The retina was detached in the form of a cord. The choroid was thickened. A thick diaphragm extended across the eye, and was adherent to the ciliary body. The lens was in front of and closely connected with this diaphragm. The lens was of bony hardness in parts, but no bony structure could be discovered here. The bony capsule showed the ordinary characteristics of bone.

The specimen was presented on account of the very extensive formation of bone, which is certainly not very common; and also because of the youth of the patient from whom the eye was taken. It is doubtful whether there is another case on record in which the formation of bone in the eye occurred so early in life.

TWO CASES IN WHICH "TRITURATION OF THE CORTEX" WAS PRACTISED IN CONNECTION WITH PRELIMINARY IRIDECTOMY, TO HASTEN THE DEVELOPMENT OF SLOWLY RIPENING CATARACTS.

By SAMUEL THEOBALD, M.D.,

BALTIMORE, MD.

ACTING upon the suggestion put forth by Professor Förster, of Breslau, in a paper which appeared in a late number of the *Archives of Ophthalmology*,[1] I have attempted recently in two cases to hasten the development of cataracts, which were very slowly maturing, by having recourse to the procedure which he has called *trituration of the cortex*—a kneading or bruising of the anterior cortical layers of the lens by pressure upon the cornea, after iridectomy, and while the anterior chamber is still empty. In the first case the excision of the iris was followed by hemorrhage into the anterior chamber, and this obscured the pupil to such a degree that the trituration, which was done with the angle of a strabismus hook as recommended by Professor Förster, was very imperfectly performed. In the second, in which the kneading was done with the smooth end of a Bowman's tortoise-shell cataract spoon, that seemed better adapted to the purpose, there was no hemorrhage, and the operation was satisfactorily completed. In the first, the operation was followed by but slight change in the condition of the lens; in the second, however, a very rapid development of the cataract ensued.

In each there occurred a sufficient amount of iritis to cause slight but persistent adhesions to form between the iris and

[1] On the Maturity of Cataract; its Artificial Ripening, Corelyses, and Extraction of the Anterior Capsule. Vol. X., No. 3, September, 1882.

lens at the pupillary angles of the coloboma ; and in the second case it was found, upon examination by oblique illumination a day or two after the operation, that near the cut edges of the iris the pigment layer had become detached from the muscular coat in a manner which was quite peculiar. That the iris should be more or less bruised, as well as the lens, however carefully the trituration be performed, appears inevitable, and the risk of exciting inflammation in this way seems the chief objection to the procedure. It would appear, however, that Professor Förster has not had serious trouble from this source, as he makes no reference to it in his paper.

CASE I.—Mrs. E. M. C., American, aged seventy-two, had been under observation since January, 1881, with immature cataracts. In March last, when the operation was decided upon, she could still count fingers by reflected light at 15″, and make out letters of J. No. 24 with the left eye, in which the cataract was most advanced, although she could not see well enough with both eyes to get about by herself, nor had she been able to do so for some months previously.

The operation was performed, under chloroform, March 20th, an upward iridectomy of medium size being made upon the left eye, and the anterior surface of the lens triturated with the angle of a strabismus hook as previously described. Two months afterward the lens was perceptibly more opaque, and fingers were counted with difficulty at any distance. May 19th, no further decline in vision having taken place, the cataract was extracted without accident, chloroform, preceded by a hypodermic of morphia and atropia, being administered. Recovery was uninterrupted, and on June 22d, when glasses were prescribed, she was able with the left eye to make out words of J. No. 1, to read No. 2 quite well, and had V. = $\frac{20}{xxx}$.

CASE II.—Mrs. E. H., German, aged fifty-four, had been under observation since January, 1881 ; cataracts, which were then incipient, the opacity in each eye being confined chiefly to the peripheral portion of the posterior cortex, having developed very slowly during this time. Just previous to the operation, which was performed upon the left eye on May 26th, the condition of the lens was carefully examined with

dilated pupil. Much clear lens matter was still present, the opacity being confined chiefly to the nucleus and peripheral cortex, and with the ophthalmoscopic mirror a decided red reflex was obtained through the enlarged pupil. Within ten days after the trituration the lens was decidedly more opaque, and by June 14th the red reflex had entirely disappeared. When last examined (July 14th) the entire lens was opaque, the opacity extending quite to the capsule; mother-of-pearl sectors, however, were still present, and for this reason, and because of the very hot weather, it was thought best to postpone for a few weeks the extraction operation.

REMARKS.

DR. GRUENING had performed Förster's operation twice during the last year, and had already given the result of the operation at the April meeting of the New York Ophthalmological Society. The first case was that of a lady, upon whom he had operated for cataract in one eye; she had an immature cataract in the other eye, and inquired whether or not something might be done to hasten the ripening of the cataract. Dr. Gruening performed a large iridectomy upward, and with the angle of the strabismus hook also triturated the lens, but only in the area of the pupil. The result was that no iritis occurred, and the lens became completely opaque within one week. He extracted the lens three weeks subsequently with a very good result.

The second case was that of an old gentleman highly myopic in both eyes with double cataract. The condition of the gentleman for four or five years was very sad; he was gradually losing the power of reading, and he was anxious to retain his position which entirely depended upon his vision. Dr. Gruening proposed this operation to him, and in March of this year he came to New York, where he performed iridectomy upward, and again triturated the lens, as in the former case, only in the area of the pupil, and in four days the lens was completely opaque. He has not yet performed cataract operation. But if the patient continued to do well, he should in September remove the cataract. There are certainly cases in which the operation is indicated and is attended with great gain.

DR. KIPP performed the operation some time ago, and the

lens became opaque, but within four or five days it cleared up again.

DR. MITTENDORF said his experience had been equally favorable with that related by Dr. Gruening. In a second case, however, iridocyclitis followed, which destroyed the eye. Ever since Dr. Gruening had suggested to confine the triturating process to the pupillary space, he had been pleased with it, and had not had iritis or any other unpleasant symptoms develop. He thought the operation was especially indicated, under certain circumstances, when two cataracts are forming at the same time, or when the patient has only one useful eye.

DR. KNAPP said he had performed the operation once, and it had not seemed to hasten the ripening of the cataract very much.

DR. WADSWORTH had performed the operation but once, on a lady eighty years of age, in whom the cataract was very slow in maturing. Although he had endeavored to confine the pressure as much as possible to the area of the pupil and coloboma, there resulted some slight adhesions of the pupillary edge, and there seemed to be no effect at all so far as increasing the opacity of the lens was concerned. He thought the effect would be probably quite different in different cases. To illustrate the resistance a lens sometimes offers, he mentioned a case of partial diabetic cataract, stationary for a long period, in which he had three times, at intervals of a week or ten days, thrust a cataract needle into the lens, but at the end of six months, aside from the visible scars in the capsule, there was no increase in the opacity of the lens.

DR. WEBSTER said that when in London in 1881, Mr. Cooper was trying a series of operations upon immature cataracts, and up to that time he said he had been successful in his operations. Dr. Buller, if he recollected aright, was house surgeon at that time, and he wished he would tell the Society whether or not Mr. Cooper continued his experiments.

DR. BULLER said he was not prepared to speak positively on this subject with regard to trituration of the surface of the cataract after preliminary iridectomy, but ten years ago it was regarded as no new operation as he recollected; he could not make any statement as to the results owing to the difficulty of following up such cases in hospital practice.

DR. L. WEBSTER FOX said he was house surgeon at the time at Moorfields when Mr. Cooper was operating in this way, and that he made a series of cases in which he resorted to different operations for ripening the cataract, but he was

unable to give any definite statistics with regard to the results.

THE PRESIDENT said he had performed the operation eight times, and in seven cases had performed extraction subsequently. The only cases in which anything serious complicated the operation was that of a patient who developed marked iritis, and on extracting the cataract, it became necessary to perform iridotomy in order to get a clear pupil. In operating upon the second eye in the same patient a slight iritis followed, but not nearly so severe as after the operation upon the first eye, and it did not interfere with the subsequent extraction, which was entirely satisfactory.

In one other patient adhesion of the iris took place with the lens in consequence of the preliminary operation, but it was not disadvantageous to the subsequent extraction. In all of the cases subsequently submitted to extraction this operation has been accomplished without detrimental influence, and all the cases had turned out successfully. The duration of time after the operation for bringing the lens into suitable condition for extraction had varied considerably, that is, from three weeks to two months. He did not know whether any one could anticipate in any particular case that the process of maturing would be more or less rapid. It is interesting to watch the development of opacity, and to notice that it does not make its appearance upon the surface which has been directly the subject of friction; in other words, upon the anterior surface of the lens; it may make its appearance upon the posterior surface of the lens in some cases, and in other cases it may be general.

Again, he had not noticed any swelling of the lens, such as takes place in traumatic cataract. In his own mind he had not felt sure whether an increase of opacity in lens has been due directly to the friction of the anterior surface, or whether it might not be ascribed to tension placed upon the suspensory ligament and interference with its nutrition about its periphery. His experience was such that it enabled him to say that the operation was a valuable addition in a particular class of cataract cases, and that it is free from danger to any important extent when it is carefully managed.

DR. GRUENING remarked that by the area of the pupil he meant the pupil, including the coloboma. He would also ask Dr. Noyes whether he observed iritis in those cases which were treated in this manner, that is, trituration made in the area of the pupil.

THE PRESIDENT said that iritis did not occur to any extent

except in three cases. In all of his cases he confined the operation as nearly as possible to the centre of the cornea.

DR. WEBSTER asked if, when the cataract was extracted, the lens came out entire.

THE PRESIDENT replied that there was apt to be a good deal of cortex at the extraction.

DR. WEBSTER replied that in looking over Dr. Agnew's cases he found two in which vision was sufficient to count fingers, and the lens came out entire and the result was as good as the average, that is, one vision $\frac{20}{30}$, and the other $\frac{20}{50}$, without inflammation during recovery. Whether he would have gained anything by the preliminary iridectomy and trituration of the lens he was unable to say.

DR. THEOBALD said he took it for granted that no one would think of attempting to triturate the lens through the iris. In his cases the trituration was confined to the pupillary area. Even under such circumstances, however, he believed the iris tissue was more or less bruised, because it was impossible to press the cornea against the exposed surface of the lens with sufficient force to comminute the cortical substance without pinching the pupillary edge of the iris between the lens and the cornea.

DR. DYER asked as to about how long the rubbing process was continued by Dr. Noyes?

THE PRESIDENT replied that it was difficult to state how long the trituration should be continued. In his cases the performance of friction was continued probably for a longer time than ordinarily is necessary from the fact that the anterior chamber was full of fluid, and with sufficient force to depress the cornea decidedly, but not sufficient to give rise to loss of vitreous or rupture of the ligament.

VASELINE CERATE—A CONVENIENT BASIS FOR OINTMENTS INTENDED FOR APPLICATION TO THE EYELIDS.

BY SAMUEL THEOBALD, M.D.,

BALTIMORE, MD.

FOR several months I have been using with much satisfaction, both in private and hospital practice, as a basis for ointments intended for application to the eyelids a cerate made of yellow wax and vaseline. Previously I had employed either simple ointment or cold cream; but as both of these have a decided affinity for oxygen they soon become rancid, and the substances incorporated with them—especially the frequently prescribed yellow oxide of mercury—undergo chemical changes which render them unfit for use. Plain vaseline, which many make use of for this purpose, is not open to this objection; but as it melts at the temperature of the body it is not well adapted for external application. Several years since, by melting paraffine and vaseline together in proper proportions, I obtained an ointment of sufficient firmness, but its consistence was such, lacking the stickiness, that it was not well suited to smearing upon the lids. More recently, by substituting yellow wax for the paraffine—this being found to give an ointment of better consistence than white wax—I have obtained an article which has proved in every way satisfactory. The cerate is prepared without difficulty, by melting the wax and vaseline together with a gentle heat, and stirring the mixture until it hardens. The specimen exhibited was prepared in this way, it contains one part of yellow wax to four parts of vaseline, which proportion gives an ointment of sufficient firmness, except perhaps in very hot weather, when the proportion of wax may be in-

creased to one part to three. The other specimen shown, an ointment of the yellow oxide of mercury, containing two grains of the mercury salt to one drachm of vaseline cerate, though prepared nearly four months since, and kept with no special care, still retains, as will be seen, its bright yellow color, and has undergone no appreciable change.

Cerates prepared with vaseline, I am told, are in use; but I am not aware that attention has been called to the convenience of employing in the manner here suggested.

A CASE OF BLINDNESS FROM RETINAL THROMBOSIS IN CONSEQUENCE OF FACIAL ERYSIPELAS.

By H. KNAPP, M.D.,
NEW YORK.

ONLY a limited number of cases of blindness in consequence of facial erysipelas is on record. Their symptoms vary considerably. There is a lack of ophthalmoscopic examinations during the first stage of the affection. Not long ago I had the rare opportunity of observing such a case almost from the beginning to the end. The results appearing very remarkable in many respects, I feel justified in bringing them to the notice of the society, so much the more so as I can lay before you a number of ophthalmoscopic drawings representing the different stages of the disease. The case is as follows:

Mr. E. F., a gentleman aged forty years, had lived long in the tropics. He contracted syphilis, and showed in the course of years secondary and tertiary symptoms, which commonly were aggravated when his business called him north. On March 20, 1883, while in New York, he was affected with erysipelas, which began in the nose, proceeded to the pharynx, cheeks, and orbits. Temperature, 104; pulse, 120–130. On March 22d the swelling had reached the forehead, both ears, and both sides of the neck. On the 25th the general symp-

toms abated, pulse and temperature were normal, but the eyelids were more swollen, and chemosis and exophthalmus made their appearance. March 27th the sight of the right, and March 28th that of the left, eye was impaired. March 29th he was totally blind. Drs. Gulecke and Schottke, under whose care the patient was, and who kindly allowed me to publish the case, had made deep incisions into the upper and lower parts of each orbit, without liberating pus. On March 29th they called me in consultation. I found both lids of each eye swollen, dark red, hard, shining; conjunctivæ chemotic; both eyeballs moderately protruded, completely immovable, the pupils wide and immovable; no perception of light. Carbolized drainage-tubes were in the incisions. The right cornea had a superficial ulcer, somewhat obscuring the fundus. Apart from this ulcer the media of both eyes were clear, and a distinct view of the fundus could be had. The appearance of the left fundus (represented in Fig. 1)[1] showed a milky retina, pervaded by numerous dark, almost black, tortuous, overfilled blood-vessels, which, tapering, converged to a common centre, and had upon and between them many irregular dark hemorrhages. The character of all the vessels was the same, they appeared as enlarged veins. The picture resembled that which I have seen in some cases during the first days after resection of the optic nerve in removal of orbital growths and after optico-ciliary neurotomy. My opinion was that the ocular affection was thrombosis of the retinal veins, and complete obstruction of the central retinal artery by compression from the swollen and hardened cellular tissue of the orbit. Prognosis quoad visum pessima, quoad vitam dubia, ad bonam vergens. Treatment derivative, especially diaphoretic.

Two days later, March 31st, I found the swelling of lids and conjunctivæ less, the right cornea hazy, details of right background not discernible. The left cornea and media were clear, the fundus less white (Fig. 2). The dark and tortuous

[1] The drawings, executed in chromo-lithography, will appear in the first number of the thirteenth volume of the Archives of Ophthalmology.

veins appeared the same as two days previously; some, however, were thicker and had elliptical intumescences. Between and crossing them were seen thin, straighter, and red vessels (arteries) with punctate, striated, and irregular bright red (fresh) hemorrhages, whereas the older ones were dark brown. A trace of the optic disk was visible, but the yellow spot could not be made out. In its vicinity there were many old hemorrhages. The periphery of the fundus was whitish red, pervaded by dark blood-vessels, among which the arteries were not distinguishable. The hemorrhages at the equator were small and round; beyond the equator there were none. Eyes moved again, though little. V. = 0.

April 2d.—Right eye still greatly swollen and protruded; mobility very limited; cornea clears up; fundus visible, the same picture as in the left. Left eye less swollen; mobility increased; the whole disk now recognizable; milky appearance diminishing. Vessels and hemorrhages the same.

April 4th.—L. disk well defined, homogeneous, pervaded by two tortuous thin vessels, the up and down branches of the central artery. R. disk visible, veins go to its centre, background clearing, but still full of old and new hemorrhages. No perception of light.

April 6th.—T. ? Retinæ clearer. Veins less black, being now brown. Arteries distinguishable, reaching, in left eye, to centre of disk, in right the veins reaching likewise to centre of disk; the arteries not so far. V. = 0, each eye.

April 9th.—Vessels thin on and near disk, with white seams lining a thin red thread in the centre. The vessels are thicker at the periphery. Disks and retinæ clearing. Hemorrhages the same.

April 18th.—Some portions of veins appear as white lines, the rest are filled with blood. Disks quite white. Arteries likewise partially interrupted by white lines.

April 22d.—Condition of left eye presented in Fig. 3. Disk white. Arteries and veins clearly distinguishable. Arteries in some places bordered with white seams (opacity of the vascular walls by defective nutrition), and like the veins in some places interrupted by snowy-white lines (white thrombi).

The veins in some places appear nodular, like a rosary, but there is no movement of the contents of the vessels, either spontaneously or on pressure upon the globe. Hemorrhages still numerous.

May 1st.—More portions of blood-vessels are converted into white streaks. Left od white as paper.

May 25th.—Feels well. Both eyeballs move somewhat to the right and to the left, but not in any other direction. Pupils large, immovable. V. = 0. Odd white; all the upper and most of the lateral blood-vessels converted into white streaks varying in thickness along their course; in lower part some perfectly pervious, others interrupted by white segments. The branches in region of yellow spot numerous and all white.

June 28th.—Almost all arteries white, irregular, some breaking off suddenly (Fig. 4). In region of yellow spot, a beautiful network of anastomosing white lines. Retinal tissue semi-transparent, with white patches, especially in region of yellow spot. The two lower vessels (inv. image), one artery, one vein, red. In the right eye only a few white vessels and one or two red ones visible, disappearing from view not far from the disk. V. = 0 in each eye. The movements of both eyes are restored, the exophthalmus has disappeared, the tension and external appearance of the eyes are normal, except a corneal opacity in the right, and a wide, immovable pupil in both.

Reserving a detailed discussion of this case for a publication in the *Archives of Ophthalmology*, I restrict myself here to the following remarks:

1. The blindness was produced by compression of the central retinal arteries and subsequent thrombosis of the retinal veins, both having been directly observed with the ophthalmoscope one day after the occurrence of the rapid, almost sudden loss of sight.

2. The ophthalmoscopic appearances, observed from beginning to the end, showed no neuro-retinitis, but the successive stages of thrombosis.

3. The decrease of the swelling of the orbital tissue, or

the establishment of collateral circulation from the choroid, permitted the return of a limited flow of blood into the retinal arteries, which, however, being impeded by the blocked veins, led to renewed extravasations, to thrombosis and shrinkage of the arteries, and finally to atrophy of the optic nerve.

4. Perivasculitis played no, or only an unimportant, part in the pathology of this case.

5. The white segments in the veins and arteries were white thrombi, not hypertrophy of the walls of the blood-vessels.

6. The thrombosis was present, in all probability, also in the orbital veins, but did not, as in other cases, extend to the cerebral sinuses.

Of the recent literature on the subject I confine myself to mention here:

1. A paper by Leber, *Graefe's Arch.*, Vol. XXVI., Part III., p. 224.

2. The inaugural dissertation of Dr. J. Hoesch, containing a case, under the care of Dr. Baumeister, of Berlin, almost identical with the one here reported, only incompletely observed and differently explained. Berlin, 1881.

3. A paper on "Orbital Cellulitis as a Sequence of Facial Erysipelas," by Henry W. Williams, of Boston. *Boston Medical and Surgical Journal*, January 18, 1883.

4. A monograph of 270 pages on "Orbital Phlegmone, with Consecutive Blindness," by A. Schwendt, written under the auspices of Professor H. Schiess, of Basel. Basel, 1882.

REMARKS.

Dr. Kipp asking whether there was any marked retinitis,

Dr. Knapp replied that there was a milky appearance of the retina, but it was limited to the central part, as it was in embolism; the periphery was normal. There was no neuroretinitis. The nerve was never swollen at all.

Dr. Kipp said that in all the cases which he had seen this condition which Dr. Knapp described was found at some portion of the fundus, and in these cases the retina, or its vicinity, was in a state of inflammation, at least opaque not between the veins, but in the surroundings of the veins.

Dr. Knapp remarked that what struck him most in this case was that after a certain time segments of the veins be-

came white and he thought that fact could be used as a diagnostic symptom of thrombosis.

THE PRESIDENT said that many years ago he saw a case of severe phlegmonous inflammation of both orbits, and had an opportunity to examine, while in bed, the fundus of each eye, and it presented the appearance which had been described by Dr. Knapp. The process was confined more particularly to the optic nerve; there was swelling of the nerve and neuro-retinitis, and subsequently optic atrophy. The patient was not absolutely, but was nearly entirely blind; it was not a sudden case, as was Dr. Knapp's, but seemed more like a case of simple neuro-retinitis, chiefly papillitis.

DR. KNAPP, replying to the remarks of the President, said that other cases which had recovered from facial erysipelas had regained sight. It was quite possible that neuro-retinitis might occur with this condition of thrombosis, such as he had described. But it had not been observed directly.

With regard to thrombosis of the orbit which follows injury to the globe, he lately operated on a patient who had lost one eye by suppuration. He was an actor, the eye staphylomatous. As it was essential for his career that there should be as little disfigurement as possible, Dr. Knapp made evisceration of the globe. After having cut off the corneal protrusion, he wiped the eye out completely without special hemorrhage, and powdered iodoform thinly over the conjunctiva. There was no suppuration whatever, but the cavity of the sclera filled with blood, the eye protruded, the patient had cerebral symptoms, and the scleral stump was pushed forward. The case presented the picture of orbital cellulitis with thrombosis, as in the man who had it from facial erysipelas. Gradually he got well, but it seemed he had been not far from the grave. Dr. Knapp would like to ask if any of the members had ever met with a similar condition.

In reply to a question by Dr. Seely, as to how much iodoform was used, Dr. Knapp said that only a very thin layer was applied, and that it did not produce any reaction; he did not think that the iodoform had anything to do with the subsequent condition.

THE PRESIDENT said he had seen a true, but moderate œdematous condition remain in the orbit for a long time after the performance of the operation; but it had not been followed by symptoms to be regarded as an aggravation of the previous condition. He had not seen the process of thrombosis and aggravated orbital inflammation following evisceration.

CHANGES IN REFRACTION RESULTING FROM A BLOW.

BY W. H. CARMALT, M.D.,

NEW HAVEN, CONN.

R. A. S., aged twenty, a student in the sophomore class of Yale College, New Haven, myopic since twelve years of age, consulted me on October 23, 1882, reporting that while practising in the gymnasium the day before, he had fallen violently forward, striking his right eye upon a bolt projecting from the floor. The blow was quite severe, sufficient to shake him up so that he kept quite still the remainder of the day and evening, neither going about nor studying, but at the time of his visit he felt quite well again, except as to his eye. Wearing his glasses habitually for all purposes of vision, near or far, he now felt an uncomfortable sensation in looking through his right glass, and could see much better at distance without it—better, indeed, than he remembered ever to have seen before without glasses; but for all that, he had a very confused sensation when looking with both eyes either with or without glasses. During the summer of 1881 his eyes had been examined in Paris—he could not remember by whom—and his present glasses were then given him, and he had seen perfectly well with either eye with them until the day before. I found them to be for the R. E., — 4.5 and L. E., — 5.5.

The time at his disposal was short on that day and my examination necessarily somewhat hasty. So far as I could determine, however, I found the refraction of his R. E. to be M. = — 1.5 (V.=0.5) ⊂ — 2. cyl. ax. 165°, V. = 0.8 —, and of his L. E., M. = — 6. V. = 0.7.

I have no note as to the actual condition of his accommoda-

tion on that day, but reading with that eye, with or without glasses, was painful to him and he declined it. I detected nothing abnormal about the movements of his iris, the pupil was round and clear and the lens gave no reflection by oblique illumination. The ophthalmoscopic examination was quite painful, but I examined the fundus by both direct and indirect methods and detected nothing abnormal, though, for the reasons already given, the observation was necessarily not exhaustive. I deferred further examination until I could get data as to his previous condition and wrote to his father, a surgeon of eminence in New York, and of very considerable ophthalmological knowledge, for the previous history of his son's refraction, and received answer, that in 1878 his eyes had been examined and recorded: R. E. = — 4.5, and L. E. = — 5.5, V. 1 in each eye; again in 1880, R. E. = — 4., L. E. = — 5.5, V. 1, and these were the only recorded observations as to his previous condition, but he knew of nothing unusual from ordinary cases of M.

Owing to a misunderstanding, I was not consulted again until February 24, 1883 (four months), when I made the R. E., without atropia, to be Asm. = — 1. cyl. ax. horiz., V. = 0.7; L. E., also without atropia, M. = — 7, V. = $\frac{20}{20}$, *with normal accommodation in each.*

I then instilled a one per cent. solution of atropia into the R. E. several times in the course of about two hours and obtained Asm. = — 0.75, cyl. ax. horiz., V. = 0.7, with total paralysis of accommodation.

On ophthalmoscopic examination at this time there was no conus at the nerve, nor other evidence of retino-choroidal trouble—not so much as I expected to find with the degree of previous M. as reported. By oblique illumination no opacity of the lens was detected.

At my request for a consultation, he called, the day following, upon Dr. Loring, of New York, who, giving a more careful examination, made the refraction of R. E., M. = — 0.75 s. ⌒ + 1.5, cyl. ax. 80°, V. = 1; L. E., M. = — 6. s. ⌒ — 0.75, cyl. ax. 45°, V. = 1, subject, however, he stated, to revision.

Subsequently, on March 4th, after the effect of the atropia

had passed entirely off and his range of accommodation was found to be normal, I found that the combination for the

$$\text{R. E. of } \begin{cases} +1. & \text{cyl. ax. } 90^\circ \\ -0.75 & \text{“ “ h.} \end{cases} \text{ gave V. } = 1. +;$$

L. E., M. -6.5 s. -0.5, cyl. ax. 30°, V. $= 1. -$;

and that he had an insufficiency of the int. recti muscles $= 5$. On May 30th I examined the left (the uninjured) eye under full paralysis of A. and found M. $-6.5 \supset -0.5$, cyl. ax. 25° . V. 1. —. There was, therefore, a sp. of acc. of this eye of 0.5 D. The A. of R. E. was perfect, with crossed cyl. glass could read No. 1 Sn. at 4″.

To summarize the facts of this, to my knowledge, unique case, it seems established that in a case of myopia of very considerable and nearly equal degrees in the two eyes, one was reduced by the impact of a blow to a condition of astigmatic myopia which resolved itself finally into a mixed astigmatism, without any loss of acuity of vision or range of accommodation.

In endeavoring to account for the mechanism of this change, five possibilities present themselves: First, a change in the shape of the cornea; second, a diminution or shortening of the axis of the globe; third, a displacement or dislocation of the lens backward; fourth, a pre-existing spasm of accommodation, the tonicity of which had been released by the paralytic effect of the blow; fifth, a change in the relative positions or arrangement of the lenticular fibres.

My first thought, after examining the patient the day following the receipt of the injury, was that there had been such a concussion of the lenticular fibres that the alteration in the refractive media was there, and I felt strongly that it was but the preliminary stage to the formation of a cataract. My mind was so impressed with this idea that I did not at that time advise a change in the glass of that eye, but impressed upon the patient the importance of noticing any failure in vision of that eye and to report. He did not notice anything of the kind and failed to report until four months had elapsed, when the myopia had entirely disappeared, leaving apparently the myopic astigmatism of $-1.$ axis horizontal.

When Dr. Loring examined him the following day, he measured the corneal image (reflection) with a keratometer and found it "the same as the other eye and normal." And I accept his statement as conclusive.

Without giving his grounds therefor he further states: "I exclude a change in the length of the ball." I had arrived at the same conclusion, from the absence of any apparent changes in the fundus in the examination made on the day after the injury, as also any trace of it in the subsequent examination on February 24th. I could not conceive so great a disturbance in the sclera and choroid, and occurring so suddenly, without some structural changes sufficient to be detected by the ophthalmoscope, and I examined very carefully by both the direct and indirect methods.

Dr. Loring examined him by the catoptric test and wrote: "I get all these images in their proper places, and what appears to the naked eye of their proper size. Still I did think the image from the anterior surface of the lens was smaller than in the other eye. This, however, may not be so," and in another place in his letter, after discussing the case with much interest, he says, "I make the cause to be a change in the position of the lens and in its curvature;" also, "Another thing which makes me think it, the trouble, is in the lens and its position is that the pupil does not dilate evenly."

On the following day, February 26th, while the pupil was still dilated with atropine, I examined his eyes for the catoptric images, without, to be sure, the aid of any measuring apparatus, but could detect neither a difference in the relative positions of these images, as compared with the other eye, nor a recognizable difference in their respective sizes. If there was a dislocation of the lens backward it might reduce, or nullify the myopia entirely, but it could only be by a rupture of the suspensory ligament of the lens either totally or in part, either of which would have shown itself also in the characteristic oscillation of the iris, in the recession of the plane of the iris, or in an interference with the accommodation; none of these were observed. As to the irregularity of the pupil referred to by Dr. Loring, while under atropia, I

did not detect it, either before or after my attention had been called to it by him. Assuming, however, that there was a dislocation backward of the lens with consequent reduction of the myopia, that would in all probability have reduced it *regularly*, not by changing a simple myopia into a compound condition of myopia and myopic astigmatism, to be followed by a mixed astigmatism. For these reasons I am unable to accept the view of a dislocation of the lens as a cause of the change in the refraction. Dr. Loring, in a subsequent verbal communication, stated that on further consideration he doubted very much if a displacement of the lens was the true explanation of the change.

Had there previously been a spasm of accommodation? Was his myopia of — 4.5 functional? He had put on glasses when about twelve years of age, because he was beginning to stoop at his lessons, and soon—I cannot state more exactly the period of time—accustomed himself to wear them for everything, reading and study, as well as for distance. There is no record of the number of the glasses he first wore, but for the last three years they have not varied from — 4.5 and — 5.5 R. and L. respectively. He has never had any pain or weariness in his eyes, the vision has never varied from time to time; there has been nothing but at first (presumably) a gradual increase of his myopia up to three years before the accident, then a steady persistence at the same degree with normal functional activity. This is certainly not what we are accustomed to see in spasm of accommodation, nor is it as we are taught in the literature of the subject. Spasm of accommodation is usually a variable quantity, and pain either in eyes or head an almost universal accompaniment. It is not, however, an absolutely constant accompaniment, and in order to eliminate this factor from the problem, so far as analogy would allow us to judge, at the suggestion of Dr. Roosa I paralyzed the ciliary muscle of the fellow-eye by a one per cent. solution of sulphate of atropia, but obtained a reduction of the myopia of not more than half of a dioptry. I cannot think that there has been a monocular spasm of accommodation all these years, convert-

ing a mixed astigmatism into a simple myopia without giving him any annoyance in the years of study preparatory to and after entering college, but which had been at last released by the blow.

The remaining alternative cannot be urged from any knowledge we have of such a condition ever having been positively determined, it is urged rather as a refuge, all the other explanations having been disproved or not being satisfactory. We know that cataract, *i.e.*, a liquefaction or fatty degeneration of the lenticular fibres is occasionally produced from a simple concussion without rupture of the suspensory ligament or capsule. There must be all grades of disturbances of the fibres, from actual solution of their continuity from violence to the simple displacement of their relations to one another which takes place in the act of accommodation. This latter is so slight and the construction of the fibres such that they become immediately restored when the pressure of the capsule is removed. Is it not *possible* that a sudden and violent impulse should have so shaken and displaced the denticulate articulations of the lens fibres that they became fastened in the position to correspond to (or cause) the error of refraction indicated above?

I acknowledge there are no observations in the literature to justify this theory, but, so far as I know, the case itself is unique, and the other possible explanations have been either disproved or are more unsatisfactory even than the one here suggested, which I make for what it is worth, hoping to bring out discussion on the part of members whose experience has been larger than my own, or who have other views.

REMARKS.

DR. KNAPP said he thought similar observations had been published, and for the greater part they were compiled in Professor Arlt's monograph on injuries of the eye (translated by C. S. Turnbull).

In these cases we find lenticular astigmatism. The ophthalmoscope shows a pear-shaped condition of the optic nerve, the side opposite to the injury gives, in the inverted

image, the large side of a pear, which is evidence that that part of the lens is the flatter. That the astigmatism does not proceed from the cornea can be made out by the reflex images. These cases may last for a long time, but certainly, if not capable of cure, are capable of improvement.

It is possible that in these cases the zonula Zinnii or the ciliary ligament ruptures or is paralyzed in a small area, as we notice frequently in the iris—irido-dialysis. In that area the elastic force of the lens is not counterbalanced by the traction from its suspensory ligament, and a greater convexity, confined to that area, is the result.

Dr. Knapp thought that a partial paralysis of the ciliary ligament, *i.e.*, one limited to a circumscribed part of its fibres, need not interfere, as had been supposed, with the mechanism of accommodation.

THE PRESIDENT said that it was difficult to account for the phenomenon upon the supposition of laceration of fibres of the ciliary ligament in the zonula of Zinn. The changes were not all produced immediately, but continued to take place for four months after the reception of the injury.

DR. KNAPP said he thought that it was possible to conceive that there was no laceration, and that paralysis might be the cause, lasting weeks or months and then disappearing.

DR. SEELY said that the special point of interest was not in the engrafting of myopia upon astigmatism, but in the diminution of the previous myopia, which was great. If he understood Dr. Knapp, the case he reported was that of production of astigmatism by injury of a myopic eye, while in the case reported by Dr. Carmalt the point of interest was the reduction of the myopia to nothing by the injury, an entirely different matter.

DR. KNAPP said he spoke only of the production of traumatic astigmatism.

DR. SEELY thought the assumption of the existence of preceding spasm of accommodation was the most reasonable explanation of Dr. Carmalt's case.

DR. CARMALT said that was a good supposition, except it must have been monocular, because he had shown no spasm in the other eye by instilling atropia.

DR. SEELY thought that fact had been previously noticed, namely, spasm absolutely relieved in one eye but not in the other at all, even after using a mydriatic for months.

DR. WEBSTER asked how it was determined that in those cases the myopia was not real.

DR. SEELY said he thought it was in one eye.

DR. CARMALT remarked that these patients came complaining of asthenopic symptoms.

DR. SEELY said certainly.

DR. BULLER asked, Why say changes in the lens?

DR. SEELY replied, because he knew of no other explanation.

THE PRESIDENT remarked that the discussion was upon Dr. Carmalt's paper.

DR. F. B. LORING asked Dr. Carmalt if there existed the peculiar blur described by Dr. Knapp.

DR. CARMALT said nothing of that kind was seen.

DR. KNAPP remarked that he did not say blur, he only said an elliptical appearance of the disk.

A CASE OF BLEPHAROPLASTY ACCORDING TO THE BRITISH METHOD.

BY E. GRUENING, M.D.,
NEW YORK.

IN planning the operation for the case here related, I could only follow one of two methods—either the Italian (Tagliacozza's), or the British (Wolfe's). I chose the latter. This method of transplanting skin without a pedicle has hitherto yielded both good and bad results, and has received praise and censure accordingly. But as positive always outweigh negative observations, I am of opinion that the cultivation of this excellent method will lead to a full knowledge of the conditions of success, and will insure for this operation its well-merited place in plastic surgery.

A young man, seventeen years of age, applied to me to be relieved of an ectropion of the right upper lid. He stated that when three years old he had sustained a severe injury of the face by the explosion of a petroleum lamp. As a result of this accident I found the integument of almost the whole forehead, of the right temple, the right cheek, and the corresponding half of the nose, changed into a dense cicatricial tissue, the upper lid everted, and its well-preserved free bor-

der attached to the supra-orbital margin. The eye, though insufficiently protected, had remained intact. The patient was very anxious to be freed from his deformity, inasmuch as he had been refused employment wherever he had offered his services. The tissues surrounding the eyes not being available for an autoplastic operation, I decided to proceed according to Wolfe's method, and admitted the patient into the eye wards of the German Hospital on October 24, 1882. Here the patient's left arm, from which I intended to take the skin required for the plastic operation, was thoroughly washed with soap and water and a two per cent. solution of carbolic acid.

On October 27th I performed the operation, the patient being under the influence of ether. As a first step, I detached the free border of the upper lid from the supraorbital margin, then undermined the neighboring tissues, exsected the deep cicatricial bands, brought the free borders of both lids in apposition, and united them by three interrupted sutures. The surface of the wound thus established measured in the vertical direction, *i.e.*, from the free border of the lid to the supraorbital margin, forty millimetres; in the horizontal direction, *i.e.*, from the inner angle of the eye to a point beyond the outer angle, fifty-five millimetres. I washed the wound thoroughly with a saturated solution of boracic acid, and, after the cessation of the hemorrhage, covered it with a pad of borated cotton previously dipped into a warm saturated solution of boracic acid. I then shaped the flap on that portion of the left upper arm, where the biceps is most prominent. The flap, as marked upon the unbroken skin, measured seventy millimetres in one direction, and fifty in the other. I prepared the flap for transportation *in situ*, that is to say, I left it in organic connection with the skin until all the subcutaneous cellular and adipose tissue had been removed. The removal of the fat was accomplished with speed and perfection in the following way: With the thumb and forefinger of my left hand I turned the flap over like the leaf of a book; an assistant then took up the lobules of fat, which I cut with scissors in my right hand.

Having thus prepared the flap, I washed the palpebral wound again with a solution of boracic acid, removed a few small coagula, and, finding that there was absolutely no hemorrhage, severed the flap completely and speedily transferred it. The flap, however, was considerably larger than the wound and overlapped it everywhere. I therefore trimmed it with scissors, giving it the exact size and form of the wound, and secured a perfect coaptation of the edges and surfaces. The parings of the flap were replaced on the wound of the arm, where, in the course of time, they became firmly adherent. The flap had no tendency to roll upon itself. It was retained in its position by a piece of gold-beater's skin upon which a layer of vaseline was spread. Pads of borated cotton were placed over both eyes and a compress bandage applied. I removed the bandage twenty-four hours later and, through the transparent gold-beater's skin, inspected the flap, which was neither displaced nor discolored. During the following twelve days I removed and reapplied the bandage once a day, always noting the same favorable appearance of the flap. On the twelfth day all the dressings were removed and the sutures uniting the lids severed. The result was entirely satisfactory, inasmuch as the flap had become firmly attached to the surfaces and edges of the wound. On that day I also tested the sensibility of the flap, and found that its peripheric portions were sensitive and the centre still anæsthetic. Two days later, *i.e.*, two weeks after the operation, the flap showed near its lower and outer edge a small circular spot of discoloration. It was the spot where, in testing the sensibility, I had pierced the skin repeatedly with a needle. The line of demarcation was soon formed and a piece of skin measuring about three millimetres in diameter sloughed away, leaving an ulcerated surface which healed in two weeks. The flap which, at the time of the operation, measured fifty-five millimetres in the horizontal and forty in the vertical direction, four weeks later had shrunk to thirty millimetres in the horizontal and fifteen in the vertical direction. This shrinkage was final, and to-day, nine months after the operation, the measurements remain unchanged. Thus the object of

the operation had been accomplished: the disfiguring ectropion being corrected and the eyeball permanently protected.

REMARKS.

DR. WADSWORTH said Dr. Gruening's paper had been of interest to him, especially as regarded the importance of keeping the flap in exact line of apposition everywhere. He agreed that the lid should be prepared first and the flap afterward, and believed this course had generally been pursued. As to freeing the flap from every particle of fatty tissue before finally severing its connection with the arm, he did not see that much was to be gained by this method. The flap is very thin, it contains no vessels, and if it is wished to preserve its vitality this can only be effected by keeping its surface in apposition with the parts beneath. So soon as it is turned back for the purpose of cleaning it, it is practically removed from the arm, even if the connection of one edge has not actually been severed. Warmth may as well be preserved by laying it on the hand of the operator. Placing the flap in warm water should be avoided. With regard to sutures he thought them usually unnecessary, and if used they should not be pushed so deeply as to cause bleeding, in which case they were of disadvantage. In the case he had reported some years ago, two sutures were employed at a part where there was a double curve of the underlying surface, and it was difficult without them to keep the flap everywhere in contact. But they were very fine, and scarcely went deeper than the horny layer of the epithelium. Sutures ought not to be relied on to prevent dragging, but simply to hold the flap in apposition till the bandage was applied. The bandage should give sufficient support.

He spoke of a case upon which he had operated with Dr. Jeffries two or three years ago, which was not a success. The patient was a young man who, a number of years before, had been treated by Dr. Jeffries a long time for lupus. There was extensive destruction of the skin on the side of the nose, and beneath and to the outer side of the eye, complete ectropion of the lower lid, and the cicatricial tissue extended so widely that it was impossible to take a flap by sliding or twisting with any chance of success. Indeed, it was doubtful in advance, if there would be found sound tissue enough to transplant upon. When the lid edge was dissected up and brought into place a considerable part of the surface of the wound was found of smooth fibrous tissue, and upon this the

flap must be placed. Although the flap worked well for a few days, it finally separated and came away entirely. In this case the skin of the arm from which the graft was taken was thicker and its contraction on removal much less than in the first case, so that it was necessary to trim the flap considerably to reduce its size.

DR. KNAPP asked Dr. Wadsworth what the ultimate result was in his case.

DR. WADSWORTH replied, in answer to Dr. Knapp, that the patient lived at a distance and he did not see him after the definitive result was reached, but there was said to have been an improvement in the appearance, despite the total loss of the graft.

DR. KNAPP thought that that was a very common result.

DR. KIPP said that in the four cases which he had reported, he operated in a manner similar to that just described by Dr. Wadsworth. In two cases he operated with perfect success, the flaps were very large and healed completely, and for two weeks remained of about the same size. After he discharged the patient the shrinking of the flaps began, and two months later they were only about one-tenth their original size. The healing, however, was perfect.

The importance of using sutures, as remarked by Dr. Gruening, was evident enough. On the other hand, that there is danger from bleeding, which cannot be arrested by making the turn according to Dr. Gruening's method, is also evident. It seemed to him that, under certain circumstances, collodion could be made to serve a useful purpose, and enable us to avoid sutures altogether.

If the parts are thoroughly dried and several little bridges are made by laying one or two fine threads across and securing them with collodion, we can get just as firm retention as with sutures, and using the collodion in such quantities, the amount of traction would be very slight indeed; besides it would be possible to use collodion that does not contract.

DR. ANDREWS had recently operated upon a case almost identical with that mentioned by Dr. Gruening. It was an aggravated case of ectropion of both lids. He applied no sutures at all, but simply applied gold-beater's skin, and over this an elastic cushion of carbolized or borated absorbent cotton, retained in place by a bandage producing only sufficient pressure to assist the plaster and keep the bared surface of the flap a gap to be filled in coaptation; in the absence of symptoms of mischief in the wound, this dressing is allowed to remain undisturbed for a week. He had been led to attach more importance to gentle compression over the flap than

to any attempt to retain it in position by means of sutures; he would ask Dr. Kipp the age of his patient.

In reply to the remarks of Dr. Andrews, Dr. Kipp said, that in the case in which there was syphilitic disease, the patient was twenty-five years of age. In the other cases the operation was performed after destruction of the lids by epitheliomata. The patients were women. Both operations failed. All the operations were of the lower lids.

DR. ANDREWS thought that the age of the patient had not been sufficiently allowed for in estimating the failures, as the skin of an old person will not heal as readily as that of a young person, other things being equal.

He had some experience in this direction in connection with skin-grafting, according to Reverdin's method, and he found that in old people the majority of grafts will fail under the same circumstances in which they would take in young subjects; but that the success was better when, in such cases, the grafts were taken from a healthy young person.

CASE ILLUSTRATING THE DIFFICULTY IN RECOGNIZING GLIOMA.

BY LUCIEN HOWE, M.D.,

BUFFALO, N. Y.

THE fact to which I would call attention is the occasional difficulty of a differential diagnosis of glioma. This can be illustrated by the brief outline of a case:

On June 13, 1881, I was consulted in regard to H. G., a male infant four months old. The attention of the parents had been called to the child's right eye about three months previously, on account of a slight redness of the globe.

The symptoms of this attack were related intelligently, and in spite of considerable cross-questioning, no evidence could be discovered which indicated more than a slight attack of conjunctivitis that had subsided without special treatment.

When the child was about two months old a yellowish reflex was noticed on the interior of that eye, and when the other was closed, it appeared from various tests that the vision of the right was, at least, much impaired.

At the time when the case came under my observation the condition presented was as follows: Cornea clear, anterior chamber very narrow, pupil moderately dilated and without any perceptible reaction, lens clear. No distinct features of the fundus could be discerned, but the interior of the globe presented that peculiar yellowish reflex which is a constant and almost characteristic appearance of glioma.

The increase of tension was hardly perceptible, but after some hesitation it was recorded in my case-book as + 1. Different tests indicated that there was no vision remaining. It is worthy of note that a grandfather on the mother's side had a well-marked epithelioma of the lip, and it was also asserted, with an appearance of truth, that a grandfather on the father's side died of a cancerous growth.

In spite of some doubt, the weight of evidence seemed to be strongly in favor of glioma, and enucleation was accordingly advised. This was done the following day. Subsequent examination showed, however, that an error had been made in the diagnosis.

There was no such growth in the globe, but as the result of a previous internal inflammation the entire vitreous had retracted into a small cone having the base resting on the lens and with the apex touching the optic nerve, its interior being filled with a semi-purulent yellowish substance composed of pus-cells, cholestrine crystals, and fat-globules.

The space between this cone and the hypertrophied retina was occupied by a fluid which escaped when the globe was opened. The slight redness of the globe which had been noticed was probably ciliary injection due to an irido-choroiditis, or a retinitis had also existed resulting in condensation of the vitreous. The reflex produced by this did not differ in any respect from that which I had seen in cases of glioma. This is not the first time that a similar error in diagnosis has been reported to this Society. In the "Transactions of 1870" Dr. Allin reports the case of a child from whom he removed both eyes for supposed glioma, and although that diagnosis was confirmed by several colleagues of wide experience, the further examination of the enucleated globes

proved that glioma did not exist. The same subject was brought up at the meeting of the Ophthalmological Society of Great Britain and Ireland last October, when Mr. Nettleship presented a paper "On Certain Cases of Destructive Ophthalmitis in Children." In this he pointed out the great difficulty of a differential diagnosis between the results of such inflammations and glioma.

It is to illustrate this difficulty that the present case is reported, realizing that quite as much is learned by failure as by success. Moreover, in view of the constant possibility of error, and also in view of the large mortality from glioma in spite of operation, it is questionable whether we are justified in such hasty recourse to enucleation as most writers are accustomed to recommend.

COMMOTIO RETINÆ; OR SOME OF THE EFFECTS OF DIRECT AND INDIRECT BLOWS TO THE EYE.

BY E. EUGENE HOLT, M.D.,
PORTLAND, ME.

DIRECT or indirect blows to the eye are of a more or less frequent occurrence, but they are rarely of that kind and character to produce what is known as "commotio retinæ," judging from the literature upon the subject. For among the numerous works upon ophthalmology there are but very few references to it, and among the abundant clinical material at Moorfields no cases are found recorded in the *Royal London Ophthalmic Hospital Reports*, the only reference to the subject being a synopsis of Dr. Berlin's paper, which appeared in the *Klinische Monatsblatter* for February and March, 1873.

The subject has been referred to but twice in the *Archives of Ophthalmology*. Articles in the London *Lancet* by Nettleship, a paper by M. Manché, read before the International Congress of Ophthalmology, and one by Seely in the *Jour-*

nal of Electrology, comprise the principal part of the literature on this subject.

This term has not been accepted by all authorities as necessary to express the condition of an eye under consideration. For while De Wecker, Warlomont, Secondi, Crispe, and Seely admit "commotio retinæ" to explain the loss of vision resulting from a blow upon or near an eye, in which an examination with the ophthalmoscope gives negative signs, others, like Nettleship, think the causes may lie beyond the parts recognized by the ophthalmoscope and which may, and not infrequently do, show themselves later in the form of atrophy.

There are still others, like Berlin and Manché, who claim that the defect of vision, in most cases, is due to irregular astigmatism in consequence of a change in the form or position of the crystalline lens.

Professor Secondi, after having examined five cases in which there was loss of vision without any ophthalmoscopic change in consequence of a blow upon the eye, concludes that "commotio retinæ" should occupy an independent place in the nosological table for the following reasons, which I translate from M. Manché's paper:[1]

1. Complete absence of lesions recognizable by the ophthalmoscope.

2. Absence of scotoma and changes in the field of vision (symptoms common in the rupture of the retina and choroid).

3. Want of all symptoms on the part of the brain and of all inflammation or consecutive atrophy on the part of the optic nerve (as there would necessarily be in case of fracture of the cranium and in hemorrhage or exudation at the origin or along the optic nerve).

4. The frequency of recoveries in such cases and the rapid action of electricity and strychnia.

Although Professor Secondi's paper appeared in the *Annales d'Oculistique* in 1871, yet Dr. Berlin's paper, two years

[1] Congrès Periodique International D'ophthalmologie. Compte-rendu. Milan, 1880.

later, evidently gave the greatest impulse to a study of these rare cases, since he gave a more extended account of the ophthalmoscopic changes and clinical and pathological characters of them, together with experiments upon the lower animals.

In his experiments upon rabbits Dr. Berlin was able to produce a similar haze to that sometimes observed in these cases, and he invariably found an extravasation of blood between the ciliary body and the sclerotic when the cornea was struck, and also between the choroid and sclerotic, corresponding to the area or areas of this haze, which represented the retina in a state of simple œdema with foldings and fissures of the rod and cone layer, produced by the sub-choroidal hemorrhage.

These changes in the fundus, Mr. Nettleship[1] thinks, furnish the true explanation of the failure of sight without appealing to traumatic changes in the lens, since he observed one case in which there was the typical haze of the retina described by Berlin with amblyopia, and which was followed in three weeks by a definite patch of disease in another part of the fundus; although in the interval between the resolution of the primary retinal haze and the appearance of the patch the amblyopia persisted, during which no visible changes were observed.

Dr. Berlin, however, does not believe that the amblyopia is due to the observed changes in the retina, for the reason, first, that vision improves at the time when these changes are on the increase or at their height; second, because the improvement of sight may remain stationary for a time after the disappearance of all visible retinal changes; and third, because he has observed two cases of loss of vision in consequence of a blow, in which there was neither external nor ophthalmoscopic changes, and without the occurrence, as he supposes, of the sub-choroidal hemorrhages. Instead of assuming that the loss of vision in these cases is caused by a "commotio retinæ"—which he entirely rejects—he explains it as due to

[1] London Lancet, June 19, 1880.

irregular astigmatism in consequence of a change in form or position of the crystalline lens.

He divides the effects of these injuries into two classes: first, those in which the central vision is principally diminished, being reduced to one-third or one-eighth, and second, those in which the loss of vision is of a high degree in all parts of the field. The first he concludes to be due to extravasation of blood in the anterior segment of the globe (as such was proven to exist experimentally), causing by its pressure the extreme resistance of the sphincter iridis to the action of atropia which is invariably observed, and a change in form or position of the lens.

In the second class of cases Berlin coincides with Knapp and Geissler that they are extremely rare, and adds that the loss of sight generally becomes permanent or of long standing.

In over one hundred injuries of the eye from more or less blunt objects, occurring in a private practice of three thousand cases of diseases of the eye, I found but four that, it appears to me, can come under the head of the class of cases under consideration.

CASE I.—J. I. S., aged forty-four, was struck on the left eye by a piece of wood which he was splitting November 16, 1880. He felt faint, became nauseated but did not vomit. On recovering he found he could not see with the left eye.

When seen, forty hours had elapsed since the accident. There was some episcleral injection, and the eye was irritable. The pupil responded very imperfectly to light and appeared to be somewhat pushed forward; otherwise nothing abnormal was observed. The tension was quite normal as compared with that of the fellow-eye, and there was tenderness to the touch in testing for it.

With the ophthalmoscope nothing abnormal in the media or fundus could be made out which was thought to be connected with the injury. Vision was reduced to counting fingers at 1 m. The field of vision was but slightly contracted. The pupil dilated slowly, and not to the full extent after repeated applications of atropia. Leeches were applied to the temple, a dose of the mild chloride ordered, and

a bandage applied. On the next day, the third from the accident, the pupil had dilated a little more under the further use of atropia, the eye felt better, and he could count fingers at 3 m. On the twenty-fifth day after the accident he had entirely recovered, and expressed himself that the sight was as "clear as a bell."

Leeches were discontinued after the third application, and the atropia after the subsidence of the congestion, when a mild continued current of electricity was used with apparently good effect. The sight gradually returned, during which time there were no ophthalmoscopic changes. Glasses were prescribed to neutralize his myopia, and he returned three months after to say that the glasses had given him great comfort. There were no changes observed in the fundus at this time.

CASE II.—E. W. L., aged twenty-eight, came to my office February 28, 1881, stating that about two hours previous to this time, while in the act of stooping down suddenly, he at the same time hit his foot against a cane, knocking it over so that the large round head of it came in contact with the right eye while it was open, giving it a severe blow and causing nearly total loss of sight. He felt faint and nauseated, but did not vomit.

There was some swelling of the lids and slight extravasation of blood beneath the conjunctiva, with a little loss of corneal epithelium. There was marked tenderness in testing for the tension, which was quite like that of the fellow-eye. The pupil responded slowly and imperfectly to light, and dilated in an oval form after the application of atropia.

With the ophthalmoscope, both before and after the use of atropia, nothing abnormal was observed.

R. E., V. $\frac{6}{60}$; Jaeger 20 at 40 ctm., slowly.

L. E., V. $\frac{6}{6}$ +; accommodation normal.

A leech was applied to the temple; he was ordered to shower the eye with a one per cent. solution of chloride of sodium quite warm, and continue the atropia prepared in castor-oil as suggested by Dr. Green.[1]

[1] Transactions of American Ophthalmological Society, Vol. II., p. 355.

March 1st.—Second day. "Eye feels clearer, and the full feeling" and tenderness of the eyeball has nearly disappeared. V. $\frac{6}{12}$; Jaeger 14 at 30 ctm. Repeated leech and continued atropia.

March 4th.—Fifth day. R. E., V. $\frac{6}{6}$; Jaeger 1 at 15 ctm.

He was examined ophthalmoscopically twice daily for two days, then once a day, and two months after the accident, but the eye always compared favorably with its fellow, which was normal.

CASE III.—C. A. S., aged eighteen, consulted me on the evening of October 26, 1881, stating that he was a freshman in Bowdoin College, and that on the evening preceding this, upon hearing the order "out lights," he passed into his sleeping-room, in which there was no light, and upon placing his face to the glass and looking out, a large lump of coal[1] came through it and struck him over the left eye. He was not quite knocked over by the blow, nor did he completely lose consciousness, but he felt nauseated and in the course of twenty minutes vomited.

He retired, but was restless and got but little sleep on account of the pain in and above the eye. In the morning he found he could not see with this eye and consulted Professor Mitchell, who advised him to return home. The pain in and above the eyeball had continued all day and had grown worse at 7 o'clock, when I saw him.

Examination showed bruises on the forehead, cheek, and nose where the missile had struck, but there was no appearance of injury of the anterior structures of the eye or its appendages. The pupil responded to light slowly and imperfectly. The eye was extremely sensitive and tender to the touch on testing tension, which was thought to be slightly increased. With the ophthalmoscope, both before and after the application of atropia, the refracting media were found to be perfectly clear.

The only change noted in the fundus was a slight increase of the size and tortuosity of the veins as compared with the

[1] The weight of which was about a pound avoirdupois.

fellow-eye. The eye was myopic 1.5 D. Vision was reduced to perception of light in all parts of the field. Ordered two leeches to temple, a laxative of mild chloride and potassium bromide with very little morphia.

October 27th.—Second day. Leeches made his head feel clearer: he soon felt hungry and ate some food. Rested fairly well. Some pain in and above the eye. Slight increase of tension and marked tenderness in testing for it. No improvement of vision.

Dr. Gordon was selected as a consultant, and he confirmed the condition as here described. Ordered two more leeches to the temple, bromide potassium with morphia, if needed, and two compound cathartic pills.

October 28th.—Third day. Leeches gave relief to dull pain in and above the eye. Slept well with one dose of soporific. Free motion of bowels. Tension like that of the fellow-eye and tenderness in testing for it much diminished. First indications of return of vision, since he can count fingers at 30 ctm. Ordered two more leeches to the temple, hot-water douche, and two and a half milligrams of red iodide in elixir calisaya twice daily.

October 29th.—Fourth day. No pain or uncomfortable feeling about the eye. Counts fingers at one metre. Leeches discontinued.

November 1st.—Seventh day. Vision has steadily gained, and without a glass is $\frac{6}{30}$; c. — 1.25 D. sph. = $\frac{6}{12}$; Jaeger 14 at 35 ctm. Had a marked languid and inactive appearance, and said he felt weak and found it a great effort to do anything. Applied a mild continued current of electricity.

November 6th.—Twelfth day. Vision $\frac{6}{21}$; c. — 1.25 D. sph. = $\frac{6}{9}$, Jaeger 4 at 35 ctm.

Ordered twenty centigrams of iodide of potassium with the red iodide to be taken in a vehicle of compound tincture of cinchona and compound syrup of sarsaparilla.

November 8th.—Fourteenth day. R. E., V. $\frac{6}{30}$; c. — 3 D. sph. $(\frac{6}{12} +) \supset$ — 0.25 D. c. 180° = $\frac{6}{9}$. L. E., V. $\frac{6}{21}$; c. — 1.5 D. = $\frac{6}{6}$ —. L. E., Jaeger 1 at 25 ctm.

Had glasses prescribed by an oculist three years ago who

used atropia in fitting them; they are as follows: R. E. — 1 D. sph. ⌒ — 0.75 D. c. 180°. L. E. — 0.75 D. c. 180°.

November 15th.—Twenty-first day. Distant vision same as test on 8th inst. Reads Jaeger 1 with left eye from 10 to 50 ctm. As he complained of not seeing at a distance as well as formerly, concave spherical were prescribed, and he was advised to begin to use his eyes systematically three minutes twice daily, and increase this time one minute each day.

November 25th.—Thirty-first day. On the 22d inst. he read twenty minutes, and had pain in the eyes at the last sitting, therefore he had omitted the reading. There was some uncomfortable feeling in and above the eye, and tenderness on slight pressure. Medicine and application of mild continued current of electricity discontinued.

November 27th.—Thirty-third day. There was some dull pain in and above the eyeball, similar to, but less severe than that first felt, and there was marked tenderness on slight pressure. The distant vision had diminished. He could make out Jaeger 1 at 30 ctm., but the letters were unsteady and he felt uncertain in reading them.

Without going into details, this was the beginning of a relapse in which the vision became profoundly affected, but was not reduced below $\frac{4}{60}$. Under a similar treatment to that pursued at first, he regained his vision and accommodation, but the process was very much slower than his first recovery.

On December 23d, the fifty-ninth day of the accident, and twenty-eighth day of the relapse, he visited Drs. Agnew and Webster of New York. Dr. Agnew wrote as follows:

"I have examined with much care the case of Mr. C. A. Strout, which you kindly wrote to me about. It seems to belong to that curious class of cases called 'commotio retinæ.' I think that your line of treatment has been very judicious. I see no occasion to divert your aim. I think that any expert called upon to make an ophthalmoscopic examination without any information given as to the previous history would fail to find any considerable lesion. There may be the slightest want of color in the disk, and it is very possible

that, following the injury or concussion, there was a very slight reaction or neuritis. I would say that a year of comparative rest, or very moderate use of the organ at near work, would be wise, treating the eyes on the plan which we follow in treating the nervous system after concussion of the brain."

The ophthalmoscope was repeatedly used, and the only change observed was a slight fulness of the veins at first, and on the third day of the accident, and during the relapse there was a doubtful retinal haze. The persistence of loss of vision to perception of light for four days, the absence of external and ophthalmoscopic changes, the relapse and final recovery, together with the peculiar manner in which the accident occurred, makes this a most remarkable case clinically and from a medico-legal point of view, since Mr. Strout's father, being an eminent lawyer, made it a test case to ascertain whether the acts done by those who indulge in "hazing" come under the law.

At the trial I took the position that as this was an unusual accident, in the nature of a concussion, and as there had been one relapse, no one was justified in making predictions as to the future usefulness of the eye, to which the attorney for the defendants objected, and thought that the case called for my "judgment as to probabilities rather than possibilities."

The condition of the eye, July 6, 1883, over twenty months after the accident was as follows: L. E., V. $\frac{6}{15}$; c. — 1.25 D. = $\frac{6}{6}$ —. Field normal. Color perception normal. Field for blue, red, and green similar to that of the fellow-eye, which corresponds nearly to the average normal as given by the very latest authorities[1] on this subject.

Case IV.—G. H. H., aged thirty-thee years, came early in the morning of May 21, 1883, stating that about two hours previous to this time, while splitting wood, a stick, a foot long and three inches thick, struck his right eye with such force as to nearly knock him over, causing him to feel faint and nauseated. There were spasms of the lids and pain in the eye,

[1] Diseases of the Eye: H. D. Noyes, M.D. Traité Complet d'Ophthalmologie par L. de Wecker et E. Landolt. Tome Premier.

slight loss of corneal epithelium, and a very imperfectly acting pupil. Ophthalmoscopic examination negative. Direct vision counts fingers at 1 m. Field but slightly affected. After several applications of atropia the pupil dilated fairly well, oval in form, the long diameter being directed downward and outward.

May 22d.—Second day. Restless last night. Pupil circular. R. E., V. $\frac{6}{6\,0}$; c. + 1.5 D $(\frac{6}{1\,5})$ ⌒ + 0.5 D. c. 90° = $\frac{6}{1\,2}$. When looking at a letter another appears to overlap it, and both are seen through a mist.

May 23d.—Third day. Sees top of letters better than the lower part: they still appear double and through a mist. R. E., V. $\frac{6}{2\,1}$; c. + 0.75 D. = $\frac{6}{1\,2}$; cylindrical glass not accepted. Throwing head back without a glass before the eye vision is $\frac{6}{6\,0}$; inclining it forward, $\frac{6}{1\,2}$. Atropia discontinued.

May 24th.—Fourth day. R. E., V. $\frac{6}{9}$; c. + 0.5 D = $\frac{6}{9}$. The double vision and mist persist to a slight extent. Inclining head forward makes vision clearer; backward mixes letters up, and he can read only $\frac{6}{3\,0}$.

May 25th.—Fifth day. R. E., V. $\frac{6}{9}$; c. + 0.5 D. sph. = $\frac{6}{6}$. There is still a slight overlapping of letters and a little mist before the eye. Throwing head forward reads $\frac{6}{6}$, backward $\frac{6}{2\,1}$, and the letters appear all mixed up.

May 26th.—Sixth day. R. E., V. $\frac{6}{6}$; Hm. 0.5 D. No overlapping of letters and no mist. Throwing head backward does not mix up letters.

May 28th.—Eighth day. R. E., V. $\frac{6}{6}$ +; no Hm. Accommodation normal. Eye feels perfectly well.

July 8th.—Forty-eight days after the accident. Ophthalmoscopic examination negative. R. E., V. $\frac{6}{6}$ +; no Hm. Accommodation normal. Field for white, blue, or red like the fellow-eye, which is normal; that for green in each eye much larger than given by the authorities referred to; color perception normal.

In reviewing these cases it will be noticed that several things are common to them all. There was the effect of the blow producing almost unconsciousness, followed by faintness, nausea, and in the severest case (No. 3) by vomiting; sudden

oss of sight from $\frac{6}{60}$ to perception of light; slight external appearances of injury from the blow in three cases; more or less imperfectly acting pupil in all, and resistance of sphincter iridis to the action of atropia. There was marked tenderness and sensitiveness of the eye manifested in testing for tension in all the cases, and this seemed to diminish *pari passu* with the return of vision. The tension was normal except in No. 3, where it was thought to be slightly increased. Ophthalmoscopic examination was negative except in No. 3, in which the veins appeared a little larger and more tortuous than in the fellow eye, and there was a doubtful retinal haze. Recovery was uninterrupted except in No. 3, in which there was a relapse. In discussing what actually happened to the eye, the force and direction of the blow may assist us somewhat.

In Nos. 1 and 4 the blow was from the rebound of a stick of wood, and the eyeball itself was undoubtedly struck more or less directly. In No. 2 the eyeball was struck directly by the round head of a cane.

In his experiments upon rabbits Dr. Berlin found that the blow directly affected the parts struck and a point in the fundus of the eye opposite, and he inferred that the eyeball was driven against the wall of the orbit and was affected as if by a direct blow, to which supposition Arlt[1] objects on account of the equable distribution of the elastic cushion in which the eye rests, although he does not deny this uniform effect of a direct blow. This part of the subject is too extensive to be further considered here. The loss of vision in Nos. 1 and 2 may be explained by a hemorrhage in the anterior segment of the eye causing change in form or position of the lens and hence irregular astigmatism. There may also have been a sub-choroidal hemorrhage, and finally a concussion of the retina. If it is admitted that each of these causes may produce the effect observed, who shall say, in the absence of positive proof, which one or, if all did not take part in it?

In Case 4 it seems quite evident that there was a change in

[1] Injuries of the Eye and their Medico-Legal Aspect. Translated by C. S. Turnbull.

form or position, or both, of the crystalline lens, and that the disturbance in vision was largely, if not entirely, due to this.

In the third case the blow was indirect, that is, the eyeball was not directly struck. The force was great, for it was stated in court that the tree, beneath which the person whom Mr. Strout saw throw the coal, was thirty-six feet from the building, and that the square of glass through which it came was fifteen feet from the ground. The hypothenuse of the triangle would be thirty-nine feet, a distance that would give to the missile the maximum velocity as ordinarily thrown by a person, thus accounting for the clear-cut hole in the glass and the absence of scattering pieces, since the glass seemed to have been taken out as a whole and applied over the eye in front of the coal.

In this case the most sanguine advocates of irregular astigmatism cannot, from this cause alone, account for the loss of vision to perception of light for four days. Nor can it be explained by the slight increase of tension, for that had disappeared before the return of vision. The absence of consecutive atrophy, and limitations of the field of vision, together with the return of sight, would militate against any lesion of the choroid, retina, and optic nerve; therefore, in this case at least, we are forced by exclusion to admit a "commotio retinæ" as the cause of the loss of vision.

REMARKS.

THE PRESIDENT remarked that Dr. Holt had reported four cases manifestly dissimilar in character. In one of these cases the injury was sustained upon the forehead. He begged to remark that that belonged to the class of cases which had been thoroughly studied by Berlin in Graefe and Saemisch's Handbook, and had been explained upon the supposition that a fissure had been made, running through the optic foramen of the orbit, and this view was corroborated by autopsies; and unless thus explained, the phenomenon called commotio retinæ is a mythical supposition. With regard to opacity of the retina from direct impact of the eyeball, he had opportunity to confirm that statement by seeing a patient who had been struck upon the eye by a blunt instrument. Inflammatory process was set up within a short period, and when he

saw the eye the distinct white patch which has been alluded to could be seen, and it remained for twenty-four hours and then disappeared.

DR. SEELY thought the subject could not be dismissed so summarily as the President had intimated. He supposed that most of us were familiar with the statement with regard to fracture running through the bone. He did not remember the details of the cases which he had published, but he recollected sufficient to enable him to say that they could not be explained by any such supposition, because a single application of electricity restored a vast amount of vision. In one case in particular, there was no explanation for the extreme lowering of vision of which the patient complained, who was struck in the eye with a piece of kindling wood. A single application of the constant current restored vision to such an amount as certainly to place the case outside of the class of which the President had spoken as being explainable by fracture. Dr. Seely thought he could not accept in Dr. Holt's third case, the explanation which had been given, although the case was not so brilliant in restoration of vision as the case which he had reported, and which he would not have attributed to commotio retinæ. He did not wish to be regarded as a defender of "commotio retinæ" especially, but he contended that there was something there which was not quite right, and which could not be so easily disposed of as we would be led to think by the experiments alluded to.

DR. HOLT asked if there was not some manifest disturbance in the field of vision in the cases of fracture.

THE PRESIDENT said that loss of sight in these cases is variable. It may be total or partial. As he listened to the other cases reported by Dr. Holt, he observed that mention was made of slight dilatation of the veins, and it seemed to be without doubt that it must fall under the class of cases of injury of the bone with consecutive interference with the optic nerve, probably in the optic canal and not of the ball, and that we should not look into the eyeball for the seat of the injury, but that the disturbance was due to traumatic influence upon the function of the optic nerve.

DR. WEBSTER asked how to explain the relapse which occurred?

THE PRESIDENT said that the man had symptoms of meningeal inflammation at first, and why not subsequent inflammation at the same point?

DR. GRUENING had had occasion to see one case of commotio retinæ, a few hours after the receipt of the injury. A

man who had been struck on the forehead came with emphysema of the lids. He was unable to open his eye, and when Dr. Gruening opened it the patient said he was unable to see; and on further examination the doctor found there was absolute blindness. On examination of the fundus the doctor found haziness of the retina as described, and the cherry-red spot which we see in embolism. The patient returned in twenty-four hours, the haziness was gone, the cherry-red spot had disappeared, and vision had returned. Certainly it was a case of commotio retinæ.

THE PRESIDENT said (in answer to remarks of Dr. Gruening) that Dr. Gruening's case meant injury direct.

DR. KNAPP said, with reference to the white opacity of the retina, that he was uncertain whether it was due to shaking of the retinal elements, or whether it in some way depended upon deprivation of nutrition, since the opacity is the same as for embolism; but the essential feature is that impairment of sight is only trifling, and disappears in two or three days altogether.

DR. SEELY said furthermore, about the uncertainty in such cases and the difficulty of explanation, that when some one would give a full explanation of unconsciousness after injury of the head, we would be better able perhaps to explain what may take place when an injury of a nerve of special sense has been sustained. He did not think we had had any explanation as yet for the phenomenon of unconsciousness.

DR. WADSWORTH introduced a case which illustrated how a comparatively small amount of violence may give rise to visible, but temporary, changes in the retina. A boy was brought to him two hours after having been struck on the eye by the recoil of a stretched rubber thread. There had been some pain for a short time. A small clot occupied the lower part of the anterior chamber. Vision was very nearly normal. The inner two-thirds of the disk was slightly reddened; there were yellowish-white, broken lines along some of the vessels going to the nasal portion of the retina, and for some distance to the nasal side of the disk the retina showed a lack of transparency, while on it were scattered whitish patches, with soft edges, resembling in color the œdema seen with embolism. Twenty-four hours later the patches and lines along the vessels had disappeared, but the loss of transparency on the nasal side and the reddening of the disk persisted several days longer.

THE PRESIDENT (in answer to remarks of Dr. Wadsworth), said, concerning Dr. Seely's case, which made such a vast

improvement under a single application of electricity, that it called to mind a patient whom he saw, a boy who was attending school in the vicinity of Boston, when he was hit in the eye with a snow-ball. He was immediately taken to a physician, who examined the eye and told him that it was seriously impaired, and that there was inflammation of the retina. The boy two days afterward came to New York, when Dr. Noyes examined him with the ophthalmoscope. At that time the patient declared that he was absolutely unable to see. Dr. Noyes examined him carefully, and determined that there was no disturbance of his visual power, and that he could see perfectly well. The boy was obstinate in his statement that he was unable to see, and to convince him that he had vision the opposite eye was bandaged and he was sent home. On the next day he returned, saying he could see. In the injured eye there was a large quantity of opaque optic nerve fibres.

DR. SEELY said that this was a good case ; but the explanation did not apply to his case.

DR. MCKAY referred to a case which he saw eight or ten years ago, in which a man proposed to bring a suit for damages on account of injury to his eye. He examined the patient several times, and detected that he had binocular vision, and told him that his injured eye was not blind, and that he would swear that he could see with it. The man then admitted he did see, and did not bring the suit.

DR. WADSWORTH referred to a case, which was cured a good deal easier than any that had been related. A boy thought that he had got something into his eye, and kept his eye shut. There was no desire or design to deceive either himself or the physician ; but he declared that he was unable to open the eye. Dr. Wadsworth gently examined the eye, and gradually coaxed the patient to allow him to raise the lid, and he soon was able to hold the lid open completely, and the patient soon afterward went home with both eyes open.

DR. SEELY said there was one point in making the differential diagnosis in his case which had not been alluded to as being present in any of the cases which the gentlemen had reported : at each visit which his patient made he held before her the fact that she was paying a fee.

TWO CASES OF OPHTHALMOPLEGIA EXTERNA, ASSOCIATED WITH DISEASE OF THE OPTIC NERVES, FROM BRAIN-TUMOR, WITH AN ACCOUNT OF THE POST-MORTEM EXAMINATION.

BY CHARLES STEDMAN BULL, M.D.,

NEW YORK.

THE two cases of ophthalmoplegia externa, associated with disease of the optic nerves, which are here reported somewhat in detail, were due to brain-tumor; and they are of interest, partly because of the opportunity they gave for studying the several symptoms as they were developed, and partly because of the autopsy which was obtained in each case.

In central paralyses of associated ocular movements it is not always easy to distinguish between cases where the lesion is at the basal centres of motion, and cases in which the lesion is situated in the cortex. In those cases of paralysis of several ocular muscles in which the power of motility of the several muscles is gradually lost, or in which both eyes have become almost fixed and immovable, the lesion is probably always basal. The symptoms here are usually more advanced in one eye than in the other, and sometimes, as in the first case here reported, the motor paralysis is associated with a progressive double optic neuritis, because of the close relation which exists between the nuclei of origin of the motor and optic nerves at the base of the brain. In the first case reported there was no ptosis of either upper lid, and this fact may be of interest in connection with Ferrier's idea of the possible existence of a separate centre for the elevation of the upper lid toward the upper part of the anterior lobe of the cerebrum. Most observers have noticed that in

well-marked cases of ophthalmoplegia externa, the levator of the upper lid is much less affected than the other muscles, and the paralysis of this muscle usually recovers first. Nettleship thinks that in central paralysis this might be accounted for by the movements of the upper lid being more automatic than those of the eyeball; but admits that this explanation would hardly apply in cases of disease of the nerve-trunk. (See *British Medical Journal*, December 2, 1882.) In both the cases here reported the iris and ciliary muscle were affected, the latter slightly, as well as the extrinsic muscles, while the levator of the upper lid was involved only in the second case. In the first case the lids were retracted somewhat as in Basedow's disease. In these cases of central origin, when the optic nerve is affected, the lesion is usually a papillitis or neuro-retinitis rather than a progressive atrophy. But in the second case the lesion would probably have been a simple descending atrophy, if the patient had lived long enough, rather than a neuro-retinitis.

CASE I.—J. L., aged thirty-four, was first seen by me on February 14, 1881. This patient was a civil engineer by profession, and had never suffered from any serious disease, except a severe and obstinate attack of malarial fever some five years before. For about fourteen months he had suffered from occasional attacks of severe headache, which at times was limited to the vertex, and at other times was confined to the occipital region. These headaches gradually increased in frequency and severity, and for the past two months had been nearly constant. For the past three months he had suffered from diplopia, which at first did not trouble him very much; but after a time it changed in character and became very confusing. When either eye was closed he at first could see perfectly well with the other, but about three weeks before he presented himself for treatment he noticed that the vision of the left eye was quite defective, and he thought that that of the right eye had very recently also failed. Since the headaches began they had occasionally been accompanied by nausea, but of late the nausea accompanied every attack of pain in the head, and oftentimes there was actual vomiting.

The patient also complained of vertigo, which was always brought on by any sudden movement and occasionally appeared at other times. With the exception of the headaches and diplopia and the gastric disturbance, the patient's health was good and his appetite remained excellent till near the last. The urine had been repeatedly examined and nothing abnormal found. When I first saw him the most marked objective symptom was the staring appearance of the eyes. There was a moderate amount of exophthalmus in a direction forward, with almost complete immobility of the left eye and limitation of motility inward of the right eye. Both pupils were equally dilated and very sluggish. The upper lids appeared retracted and drawn upwards. In the right eye, V. = $\frac{20}{30}$, and he could read Sn. D = 0.8 from eight to ten inches; in the left eye V. = $\frac{20}{200}$ eccentrically and unimproved by any glass. There was a large irregular central scotoma in the field of the left eye, and a slight indistinctness of central vision in the right eye, though no scotoma could be mapped out. The color scotoma in the left eye was co-extensive with the visual scotoma except on the nasal side of the field, where it extended somewhat farther. The media were clear in both eyes. In the left eye there was an extremely well-marked papillitis, which extended some distance beyond the margin of the disk, and was accompanied by an extensive yellowish-white exudation in the region of the macula, and by numerous punctate and striated hemorrhages. In the right eye there were the signs of papillitis in the first stage, but there were no hemorrhages and no visible exudation near the macula, or between the latter and the disk. The urine was carefully examined, but neither albumen nor casts were found. Its specific gravity was 1.023, reaction faintly acid, and there was a small amount of sugar.

An examination of the muscles of the eyes showed on the left side a complete paralysis of the internal and superior recti muscles, partial paralysis of the inferior rectus, and an apparent defect in the action of the superior oblique muscle. On the right side there was complete paralysis of the internal rectus only, the other muscles being intact. Two days later,

on February 16, 1881, vision had sunk in the left eye to $\frac{8}{200}$, and in the right eye to $\frac{20}{100}$, and here the papillitis had become nearly as marked as in the other eye. On February 19th and 20th he vomited all the food taken, and complained of severe frontal headache, and the heart's action was increased. Toward evening of the latter day the vomiting ceased, but he lost all power of recalling what had occurred during the day. At half-past nine of that evening he rose from bed and went to the water-closet and had a natural evacuation of the bowels, and on his way back to bed he drank a glass of water. At half-past ten o'clock, one hour later, he suddenly became comatose, with very slow and shallow respiration, and very rapid action of the heart. Death ensued in about five minutes after the attack began. At no time was there any increased temperature, nor any interference with either general motion or sensation.

Autopsy, thirty-six hours after death.—The ordinary signs of cadaveric rigidity were well marked. The vessels of the scalp were found exceptionally bloodless. On the removal of the calvarium there were no signs of any inflammation of the endosteum or meninges, nor any special hyperæmia of the latter. The Pacchionian bodies were well marked. On opening the arachnoid cavity there was seen to be a large amount of cerebro-spinal fluid. Both lateral ventricles were enormously distended, particularly the one on the right side, which contained nearly four ounces of fluid. The fourth ventricle was distended and its floor softened throughout nearly the whole extent. In the right third ventricle was a cystoid mass, as large as a large walnut, which was attached to and developed in the anterior end of the choroid plexus. The optic chiasm was compressed and both optic tracts were flattened to ribbon-like bands across the crura cerebri. There was a spot of softening, about as large as a silver quarter-dollar, at the anterior end of the inferior convolution of the right middle cerebral lobe. Careful dissection was made of the chiasm and optic nerves as far forward as the eyeballs, the roofs of the orbits and portions of the wings of the sphenoid bone being removed for the purpose with bone-forceps. No dis-

tention of the sheath of the nerves was found until close to their entrance into the sclera, where there was a slight distention. This was more marked in the left eye than in the right eye, where it did not extend all round the circumference of the nerve. The posterior portions of the eyes, with the optic nerves, chiasm, and tracts as far as the cerebral peduncles, were removed for microscopical examination. The thoracic organs were found tolerably healthy, with the exception of some bands of adhesions between the costal and pulmonary pleura on the right side, the remains of an old pleurisy. The liver was slightly enlarged and fatty; the spleen was enlarged, with signs of old infarctions. The kidneys were normal in size, and the cortex showed only slight signs of disease. The other organs were not examined. Microscopical examination of both transverse and longitudinal sections of the optic tracts, commissure, and extra-orbital parts of the optic nerves showed the ordinary signs of atrophy from pressure in both the neuroglia and nerve-tissue itself. As the intra-orbital portions of the optic nerves were reached, however, very evident signs of interstitial neuritis were met with, and these increased as the region of the eyeballs was approached. There was an enormous development of nuclei, some round, others elongated, and a very marked hypertrophy of the connective-tissue fibres of the neuroglia, the latter being more numerous in the posterior part of the intra-orbital division of the optic nerve, while the cell-proliferation was more marked near the scleral termination of the nerve. The optic disk was seen to be very much swollen and the cellular proliferation was excessive here and extended for a considerable distance into the retina, especially on the temporal side, where the exudation around the macula seemed to be of the same nature, with the addition of numerous collections of blood-globules.

CASE II.—J. T., aged thirty-three, was first seen by me early in October, 1882. This patient had had a sore upon the penis thirteen years before, which was probably a chancre, as it was followed by a general cutaneous eruption, ulcers in the throat, which have left their traces on the fauces, rheumatic pains in the limbs, and by one attack of inflammation in the

right eye. For the past four years there had been no symptoms of the constitutional disease. He had never had any malarial disease, and for more than three years he had not missed a day at his work, which was that of a builder. He used tobacco to excess, but had never used any alcoholic stimulants. About four months before he applied for treatment he began to suffer from headaches, which were always frontal or through the temples. These headaches were at first intermittent, and never lasted more than a few hours, but they gradually increased in frequency, severity, and duration, until for more than a month they had been constant, and were at times so severe as to almost craze him. During this last period he began to see double, the diplopia at first being confined to the left side of the binocular field of vision, but it soon invaded the entire field. His gait became very uncertain, especially when he rose from a chair or turned round suddenly, the feeling being that he would fall over to one side or the other. That this was not due to the diplopia alone was proved by bandaging one eye and then causing the patient to rise suddenly, walk rapidly, or turn round suddenly; the staggering and sensation of falling occurred as before, though the patient thought that they were not so marked. The patient had a blanched, unhealthy look, which, however, was different from the waxy look of chronic renal disease. There was a double systolic cardiac murmur and an intermittent pulse. The urine on examination showed albumen, but no sugar and no casts. In the right eye V. $= \frac{20}{30}$, and in the left eye V. $= \frac{20}{30} +$, and he read Sn. D. $= 1.25$ at twelve inches. The accommodation was somewhat limited. The field of vision of the right eye was slightly limited on the nasal side, but there was no scotoma in the field of either eye, and no apparent interference with the color sense. There was complete paralysis of both third and sixth nerves, and the eyeballs stood slightly divergent and immovable. There was ptosis of the upper lid of both eyes, slight exophthalmus, and moderately dilated and immovable pupils. The media were clear and there was nothing pathological in the

fundus of either eye, except a slight indistinctness and œdematous condition of the temporal margin of the optic disk and adjoining portions of the retina in the right eye.

On the supposition that the cause was syphilitic and possibly located in the kidneys as well as in the brain, potass. iodid. was administered in increasing doses, beginning with fifteen grains three times a day, and he was also given cod-liver oil, quinine, and iron, on account of the condition of the kidneys. The administration of the potass. iodid. was interrupted every few days, and an interval allowed to elapse before recommencing its administration. Under this treatment the patient's general condition improved, the albumen nearly disappeared from the urine, there being left merely a trace, and the staggering in the gait became less marked. There was, however, no improvement in the diplopia and no lessening in the severity of the headache, which it was found necessary to relieve by anodynes. On October 23d the patient had a series of epileptiform convulsions, which recurred so frequently that chloroform had to be administered. From this time on the patient slowly grew worse, though there was no recurrence of the convulsions. The headaches continued with the same severity and the staggering gait and vertigo returned, so that the patient kept his bed. On the evening of November 5th he had a convulsion, which soon passed into coma, and this gradually deepened until the following morning, when death occurred. Ophthalmoscopic examinations were made daily up to the day of death, but no further changes were noticed in the fundus of either eye, though vision had steadily failed during the last three weeks of life. The last record was on October 28th, when it was reduced to $\frac{10}{200}$ in the right eye, and $\frac{20}{200}$ in the left eye.

Autopsy, thirty hours after death.—Cadaveric rigidity well marked. Nothing abnormal was noticed in the scalp or calvarium on removal. The dura mater was firmly adherent at two or three points to the calvarium, and the blood-vessels were somewhat engorged. Considerable fluid was found in both lateral ventricles and a little in the fourth ventricle.

There was some softening of the cerebral substance discovered on incising the right middle cerebral lobe, and about midway in the substance of this lobe, and extending forward into the posterior part of the right anterior lobe near the median line, was a dense tumor about the size of a small pigeon's egg, and surrounded by a thin vascular membrane or covering. This tumor was apparently developed within the brain substance of the middle lobe, though it was somewhat nearer the base than the convexity. It was surrounded by a layer of softened brain-tissue of varying thickness. The right lateral ventricle and the portion of the right middle cerebral lobe on the median side of the tumor was pushed over beyond the median line to the left side, and the topographical anatomy of this region was considerably distorted. The optic tracts were slightly flattened, and the third and sixth nerves of the right side were pressed upon and flattened by the pressure of the tumor in the lobes, and this undoubtedly affected indirectly the corresponding nerves on the left side. There was no distention of the sheath of the optic nerves and no flattening of the chiasm. Both optic tracts were the seat of moderate interstitial neuritis, but this microscopic change was but very slightly marked in the optic nerves, and could be traced but a short distance in front of or below the chiasm. The heart was somewhat hypertrophied and was the seat of pronounced valvular disease. Hypostatic congestion of the lungs was well marked, but no other microscopic change was noticeable. The liver was large and fatty. The spleen was apparently normal. The kidneys were somewhat contracted and the cortex decidedly diseased.

The tumor, on microscopical examination, proved to be mainly composed of a very large number of small, round, granular, nucleated cells, closely imbedded in a matrix of very fine connective-tissue fibres, and contained but very few blood-vessels. It presented in places very much the appearance of a syphilitic gumma, while in others the impression conveyed of the growth was that it was a small-cell sarcoma. In view, however, of the syphilitic history of the patient, the

probabilities were regarded as in favor of its being a gummy tumor.

This case, as usual in ophthalmoplegia externa from nuclear disease, showed bilateral symptoms. The levators of the upper lids were less affected than the ocular muscles. The fifth cranial nerve was not affected.

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Dr. B. Joy Jeffries.....Boston, Mass.
Dr. Samuel J. Jones.....Chicago, Ill.
Dr. Charles J. Kipp.....Newark, N. J.
Dr. H. Knapp.....New York, N. Y.
Dr. J. A. Lippincott.....Pittsburgh, Pa.
Dr. W. S. Little.....Philadelphia, Pa.
Dr. Edward G. Loring.....New York, N. Y.
Dr. F. B. Loring.....Washington, D. C.
Dr. W. V. Marmion.....Washington, D. C.
Dr. Arthur Mathewson.....Brooklyn, N. Y.
Dr. S. F. McFarland.....Binghamton, N. Y.
Dr. R. J. McKay.....Wilmington, Del.
Dr. C. S. Merrill.....Albany, N. Y.
Dr. H. G. Miller.....Providence, R. I.
Dr. J. Lancelot Minor.....New York, N. Y.
Dr. W. F. Mittendorf.....New York, N. Y.
Dr. Russell Murdoch.....Baltimore, Md.
Dr. William F. Norris.....Philadelphia, Pa.
Dr. Henry D. Noyes.....New York, N. Y.
Dr. J. F. Noyes.....Detroit, Mich.
Dr. O. D. Pomeroy.....New York, N. Y.
Dr. Thomas R. Pooley.....New York, N. Y.
Dr. J. S. Prout.....Brooklyn, N. Y.
Dr. Wm. Rankin.....Newark, N. J.
Dr. Stephen O. Richey.....Washington, D. C.
Dr. Charles E. Rider.....Rochester, N. Y.
Dr. Samuel D. Risley.....Philadelphia, Pa.

Dr. D. B. St. John Roosa.....New York, N. Y.
Dr. Jno. D. Rushmore.....Brooklyn, N. Y.
Dr. Robert Sattler .....Cincinnati, O.
Dr. H. S. Schell.....Philadelphia, Pa.
Dr. W. W. Seely.....Cincinnati, O.
Dr. Henry L. Shaw..... .....Boston, Mass.
Dr. Francis Simrock.....New York, N. Y.
Dr. A. G. Sinclair.....Memphis, Tenn.
Dr. J. A. Spalding.....Portland, Me.
Dr. Francis P. Sprague.....Boston, Mass.
Dr. Myles Standish.....Boston, Mass.
Dr. George T. Stevens.....New York, N. Y.
Dr. Samuel B. St. John.....Hartford, Conn.
Dr. George Strawbridge.....Philadelphia, Pa.
Dr. Samuel Theobald..... ....Baltimore, Md.
Dr. William Thomson.... . .....Philadelphia, Pa.
Dr. J. J. B. Vermyne..... New Bedford, Mass.
Dr. O. F. Wadsworth.....Boston, Mass.
Dr. David Webster.....New York, N. Y.
Dr. Robert Willard.... .....Boston, Mass.
Dr. Charles H. Williams.....Boston, Mass.
Dr. E. Williams.....Cincinnati, O.
Dr. Henry W. Williams.....Boston, Mass.
Dr. J. P. Worrell..... .....Terre Haute, Ind.

Total.....87

HONORARY MEMBERS.

Dr. G. A. Bethune.....Boston, Mass.
Dr. R. W. Hooper... .....Boston, Mass.
Dr. C. Schweigger.. .....Berlin, Prussia.

Total..... 3
Whole Number.....90

MINUTES OF THE PROCEEDINGS.

TWENTIETH ANNUAL MEETING.

GRAND HOTEL,
CATSKILL MOUNTAINS, *July* 16, 1884.

THE Twentieth Annual Meeting of the Society was called to order at 10.20 A.M., by the Vice President, DR. W. F. NORRIS. After introductory remarks the following committees were appointed:

Committee on Bulletin—DRS. S. D. RISLEY and T. R. POOLEY.

Auditing Committee—DR. H. S. SCHELL.

Committee on Membership—DRS. JOHN GREEN, GEO. C. HARLAN, ARTHUR MATHEWSON, SAMUEL THEOBALD, J. J. B. VERMYNE.

The Treasurer's report was read and referred to the Auditing Committee.

Permission to furnish an abstract of the proceedings to the Medical Journals was granted, such abstract to be submitted to the Secretary before printing.

The Auditing Committee reported that the accounts of the Treasurer were correct and properly vouched, and they were accepted.

Dr. Richard H. Derby offered his resignation as Recording Secretary and Treasurer. The resignation was accepted, and the thanks of the Society for his long continued services voted.

DR. O. F. WADSWORTH was elected Recording Secretary and Treasurer.

Drs. Sutphen and Parrott were invited to attend the meeting of the Society.

The Committee on Bulletin reported. The first paper was :

1. "Iridectomy in Chronic Iritis," by Dr. H. Derby. Discussed by Dr. Knapp.

2. "Three Cases of Restoration of the Eyelid by Transplantation of a Flap without a Pedicle," by Dr. C. S. Bull.

3. "A Successful Case of Skin Flap Transplantation without Pedicle to Lower Lid, after Removal of an Epithelioma," by Dr. B. E. Fryer.

4. "Case of Gangrene of Lids with Subsequent Restoration of Tissue without Plastic Operation," by Dr. R. H. Derby.

Discussed by Drs. Pooley, Prout, Harlan, Little, Howe, Andrews, Lippincott, Fryer, Green and Wadsworth.

5. "Case of Hysterical Monocular Blindness, with Violent Blepharospasm and Mydriasis," by Dr. Geo. C. Harlan.

6. "Neuro-Retinitis, with Almost Sudden Loss of Sight in both Eyes," by H. Knapp. Discussed by Drs. Kipp, Harlan, Pooley, Wadsworth and Alt.

7. "Hereditary Atrophy of the Optic Nerves," by Dr. W. F. Norris. Discussed by Drs. Howe and Kipp..

8. "Two Cases of Orbital Tumor," by Dr. W. F. Norris. Discussed by Dr. Knapp.

9. "Jequirity Ophthalmia," by Dr. J. A. Andrews. Discussed by Drs. Knapp, Theobald, Norris, Howe, Seely, Schell, Prout and Wadsworth.

The Society then adjourned to meet at 4 P.M. for a demonstration session.

The Meeting called to order at 4.20 P.M.

10. "Demonstration of Specimens of Sympathetic Ophthalmia in a Rabbit, Excited by Injections of Jequirity," by Dr. A. Alt. Discussed by Dr. Theobald.

11. Demonstration, by Dr. H. G. Miller, of a "New Perimeter," designed by Dr. E. Dyer. Discussed by Drs. Mittendorf and Green.

Adjourned to meet at 8 P.M.

The Meeting called to order at 8.30 P.M.

The order of Bulletin resumed.

12. "A Case of Embolism of the Retinal Artery," by Dr. H. S. Schell. Discussed by Dr. Norris.

13. "A Case Illustrating the Natural History of Cataract," by Dr. A. Mathewson. Discussed by Dr. Green.

14. "Experiences in Refractive Cases," by Dr. W. W. Seely. Discussed by Drs. Mittendorf, Little and Theobald.

15. "Clinical History of a Case of Sympathetic Ophthalmia," by Dr. L. Webster Fox.

16. "Two Cases of Orbital Abscess," by Dr. J. A. Lippincott. Discussed by Dr. Theobald.

17. "Cases of Disease of the Frontal Sinus," by Dr. C. J. Kipp.

18. "Changes in the Eye Immediately after Death," by Dr. L. Howe. Discussed by Drs. Norris and Mittendorf.

At 10 P.M. the Society went into executive session.

Dr. Green, for the Committee on Membership, recommended the following candidates for election: Dr. Myles Standish, Boston, Mass.; Dr. John Van Duyn, Syracuse, N. Y.; Dr. Stephen O. Richey, Washington, D. C. These gentlemen were elected.

After some discussion as to the place of meeting for the next year, during which the Pequot House, New London, the Kaaterskill House, Coney Island, Long Branch, and Long Beach were suggested, an informal ballot was taken which resulted in favor of New London.

The Society then adjourned to meet at 9.30 A.M., July 17th.

July 17th.

The Meeting was called to order at 10 A.M.

Dr. Green, for the Committee on Membership, proposed to amend the Constitution by adding to Article 3, "Candidates for membership shall have been engaged in the practice of Ophthalmic Surgery for at least five years, shall have given evidence of satisfactory scientific attainments, and shall have

conducted themselves in conformity with the ethical rules of this Society."

The Meeting adjourned for five minutes.

At 10.15 the Meeting was called to order again, and the reading of papers resumed.

19. "A Case of Glioma of the Retina," by Dr. Wm. S. Little. Discussed by Drs. Theobald, Mittendorf, Sutphen, Mathewson, Knapp and Howe.

20. "A Partial Report of the Progress of the Examination of the Color Sense of the Employees of the Pennsylvania Rail Road," by Dr. Wm. Thomson.

21. "Two Cases of Swelling of the Optic Nerve, possibly Congenital," by Dr. Geo. C. Harlan. Discussed by Drs. Risley, Mittendorf and Kipp.

22. "Two Cases in which Raehlmann's Hyperbolic Lenses improved Vision," by Dr. G. Hay.

23. "A Case of Myxoedema with Atrophy of the Optic Nerves," by Dr. O. F. Wadsworth. Discussed by Dr. Little.

24. "A Case of Acute Dacryo-Adenitis," by Dr. Thomas R. Pooley. Discussed by Drs. Kipp, Knapp, Mittendorf and Miller.

25. "Polycoria," by Dr. W. F. Mittendorf. Discussed by Dr. Seely.

26. "A Plastic Operation," by Dr. Edwin Hutchinson.

27. "Removal of Foreign Bodies from the Vitreous with the Electro-Magnet," by Dr. J. Aub. Discussed by Drs. Knapp, Mittendorf, Harlan, Hutchinson, Little, Green, Seely, Kipp and Wadsworth.

28. "A Case of Hypermetropic Astigmatism Passing into Myopic," by Dr. S. D. Risley. Discussed by Drs. Knapp, Hay, Theobald and Seely.

The Society went into executive session.

Dr. Green moved the passage of the proposed amendment to the Constitution. The amendment was carried.

Dr. Green, for the Committee on Membership, suggested

as place of meeting for the next year, the Berkeley Arms Hotel, Long Beach, or the Pequot House, New London, and moved to leave the selection of the place of meeting free in the hands of the Secretary. The motion was carried.

The Committee on Membership proposed the following list of officers, and they were elected by ballot:

President—Dr. Wm. F. Norris.
Vice-President—Dr. H. Derby.
Recording Secretary and Treasurer—Dr. O. F. Wadsworth.
Corresponding Secretary—Dr. J. S. Prout.
Publishing Committee—Drs. G. Hay and H. Derby.

Adjourned.

Present at the twentieth annual meeting:

Dr. F. W. Abbott.
Dr. A. Alt.
Dr. J. A. Andrews.
Dr. Joseph Aub.
Dr. Edwin W. Bartlett.
Dr. Richard H. Derby.
Dr. Lewis S. Dixon.
Dr. B. E. Fryer.
Dr. John Green.
Dr. George C. Harlan.
Dr. Gustavus Hay.
Dr. Lucien Howe.
Dr. Edwin Hutchinson.
Dr. Samuel J. Jones.
Dr. Charles J. Kipp.
Dr. H. Knapp.
Dr. J. A. Lippincott.
Dr. W. S. Little.
Dr. F. B. Loring.
Dr. Arthur Mathewson.
Dr. H. G. Miller.
Dr. W. F. Mittendorf.
Dr. William F. Norris.
Dr. Thomas R. Pooley.
Dr. J. S. Prout.
Dr. Samuel D. Risley.
Dr. H. S. Schell.
Dr. W. W. Seely.
Dr. Samuel Theobald.
Dr. J. J. B. Vermyne.
Dr. O. F. Wadsworth.

Present by invitation:

Dr. T. Y. Sutphen; Dr. Parrott.

O. F. Wadsworth, M.D.,
Recording Secretary.

IRIDECTOMY IN CHRONIC IRITIS.

BY HASKET DERBY, M.D.,
BOSTON.

ONE of the earliest cases in private practice, seen by me, was that of a gentleman who had long been a victim to chronic, or perhaps more properly recurrent iritis. Aged about forty, in excellent health, of ample means, and with artistic tastes, he found himself condemned to a life of inactivity on account of his liability to iritis, of which disease he had had seven attacks in one eye and eight in the other. Always most judiciously treated by his attending physician, he now placed himself in my hands, in the hope that one—fresh from his foreign studies—might be in possession of some new remedy or preventive, applicable to his case. The possible propriety of an iridectomy, then a comparatively new operation in cases of chronic iritis with closed pupil, and in glaucoma, naturally suggested itself. Being reluctant, with my limited experience, to shoulder the responsibility of surgical interference in such a case, I corresponded with von Graefe, and had made arrangements to send the patient out to him for consultation and possible operation. This plan, however, was never carried out, and I subsequently lost sight of the case.

Von Graefe, as is well known, proposed iridectomy at first only in cases of total synechia, and of closed pupil. The sphere of the operation was subsequently widened by his disciples, some of whom extended it to chronic iritis where the synechiæ were simply manifold. They claimed, *first*, that the hemorrhage incident to the operation would lessen hyperemia; and, *secondly*, that an artificially widened pupil would have less play, and consequently be less pulled upon at its points of adhesion. I quote from a monograph on iritis, published in 1862.[1]

[1] Beiträge zur Lehre von der Iritis, von C. J. von Wollowicz, München, 1862.

And as recently as 1878 de Wecker advises that a considerable portion of the pupillary edge should be freed, by performing a large iridectomy upwards, in cases where a rational treatment, exactly followed, has failed to guarantee the eye from renewed attacks; and where the several relapses have entailed numerous synechiæ.[1]

Cases of recurrent iritis are familiar to us all. The patients are many of them young, with the world before them; handicapped, as they enter upon the race of life, with a painful and dangerous disease that may befall them at any moment, and is certain for several weeks to interrupt all their pursuits. Treatment is simple and efficacious, where it may be had. But the question is, as to whether prevention is possible. Does iridectomy cure or ward off the disease? Instances of its performance in these circumstances are so rare, and the subject is of such importance, that I do not hesitate to present to the Society the notes of even a single case related, if not actually belonging to this family, carefully followed for the past four years, and furnishing an instructive commentary on the question just raised.

November 13, 1880, there came to consult me, Miss D., about sixty years of age, and in perfect health. She had never experienced the slightest touch of rheumatism, and at the time of, as well as for some time preceding her visit to me, had been as well as usual. She now complained of a "cold" in the left eye, which she said had lasted three weeks, unattended by pain and characterized mainly by redness and slight dimness of vision. I found much ciliary injection and numerous posterior synechiæ in this eye. No treatment of any kind had been resorted to. Under atropine, a shade, and rest of the eyes the synechiæ were broken up, the redness wholly disappeared, and the eye was as well as ever in five days.

But, November 18th, a similar attack came on in the other eye. Under like treatment it had disappeared by the 24th. On the 29th of the same month, the first eye again inflamed.

[1] Therapeutique Oculaire, p. 258.

A course of salicylic acid was now commenced, and the rupture of the fresh synechiæ left some pigment deposits on the anterior capsule. By December 8th she had had a slight relapse in the right eye, and a severe attack, immediately after, in the left. Iodide of potash was commenced, the local treatment remaining as before, and proving as successful. On the 11th there was much improvement, the redness having gone. A careful ophthalmoscopic examination was made, and each fundus found absolutely normal, the left vitreous being perhaps slightly hazy. A preparation of iron was ordered, to alternate with the iodide of potash. December 16th there was a relapse in the right, and December 20th in the left. December 24th in the right again, and December 26th and 31st again in the left.

To make a long story short, she had, between January 1st and June 3d, 1881, nineteen attacks in the right eye and fourteen in the left. They would last from one or two days to a week each, be attended by comparatively slight pain or lachrymation, but were always characterized by a tendency to the formation of numerous synechiæ, readily yielding to a mydriatic. These attacks ordinarily alternated, though sometimes three or four would occur in the same eye, in rapid succession. For their treatment the various mydriatics were at different times employed; tonics, alteratives and mercurials given alternately, and on one or two occasions a course of pilocarpin injections was gone through with. Nothing whatever made the slightest difference in the character or frequency of the attacks, which yielded more or less readily to mydriatics, and manifested a tendency to return as the effect of the mydriatic began to pass away. During this time I more than once had the advantage of consultation with Dr. Hay. In spite of the depressing moral effect of the continued disease, and the large amount of medicine used, the general health continued remarkably good. A change of air was several times insisted on, the patient once removing from her home and passing several weeks at the Carney Hospital on high ground; and once going to Newport for a fortnight. The attacks occurred in each of these places with the same regularity. The

eyes themselves held their own wonderfully, a few small permanent synechiæ forming in each, and some pigment being deposited on each anterior capsule, but vision remained six-tenths in each.

June 3, 1881, I ordered atropine to be applied daily through the month. This was kept up till July 6th, each eye the while remaining absolutely free from inflammation. Eight days after the atropine was discontinued a severe attack came on in the right eye. It was now resolved to keep each pupil dilated for a considerable length of time, in the hope of breaking up the tendency to inflammation. Atropine was accordingly ordered, three times a week, in each eye, the patient following me to Mt. Desert, both for the change of air, and that her case might remain under observation during my absence from the city. For two months this plan was carried out, the eyes remaining perfectly free from redness, except on one or two occasions when the atropine was accidentally omitted.

The treatment was discontinued September 9th, almost constant mydriasis having now been maintained for fourteen weeks. Six days later a severe attack occurred in the left eye, causing numerous adhesions and the formation of a membrane in the pupil. These all disappeared under treatment. Up to October 10th, Miss D. remained comparatively well, slight "flurries" of redness occurring from time to time, lasting but a few hours, and then passing away spontaneously. She now, at my request, went to New York to consult Dr. Knapp with reference to the propriety of an iridectomy. He was of opinion that this operation would do harm by setting up a fresh irritation, and advised that some time be now passed in the dark, the bowels and skin being both kept in an active condition, and atropia used locally. This was followed out to the letter, gentle cathartics being used, hot drinks given, and a warm bath administered every night before retiring, the whole being kept up six weeks. During this time she had six attacks.

Early in December she recommenced the regular use of atropine, rubbed up with vaseline to prevent irritation. No

stated attacks were from this time noted, the eyes occasionally reddening for a few hours at a time when the atropine had been omitted a little longer than usual. The health continued excellent, and the vision remained as at first, no falling off being perceptible. February 14, 1882, I discovered a slight but distinct excavation, peripheric and partial, of the left optic entrance. There was neither arterial pulse, increased tension, or limitation of the field. Atropine was in consequence no longer employed regularly, but reserved for emergencies. The attacks continued as before, one March 8th in the left eye proving unusually obstinate, and leaving several synechiæ, both above and below, that resisted mydriatics. I lost sight of her now until May 3d, when she reäppeared, informing me that for several weeks she had been in New York and treated by Dr. Knapp. He wrote me that the attacks had continued, but been mild and transient. Eserine and homatropine had been alternately used, on account of the peculiar condition of the left eye. Tension continued nearly or quite normal, and the excavation did not increase. Under these circumstances he did not think an iridectomy indicated, and gave an encouraging prognosis as to the future of this case of recurrent iritis, as he clearly considered it.

Soon after Miss D., having now been under observation eighteen months, sailed for Europe, carrying from me a letter to Professor Horner in Zurich. He examined the case, agreed with Dr. Knapp and myself as to the treatment, as well as to the undesirability of an iridectomy, gave an encouraging prognosis, and dismissed the patient. Not long afterwards she found her supply of atropine exhausted, and being unable, in the place where she then was, to obtain a fresh solution without a prescription from a local surgeon, she consulted one. She had at the time no intention of having her eyes examined, as no change had occurred, the attacks remaining mild and transient, and vision not having fallen off perceptibly. But the gentleman she went to made an examination, informed her that she had glaucoma in the left eye, that blindness was imminent unless iridectomy was promptly performed, and pressed the operation. Surprised, and in fact overwhelmed

by this intelligence, she consented. Four days later glaucoma was diagnosed in the right eye, and an iridectomy done on that. Shortly afterwards a second operation was done on the left.

The left eye was operated on October 1st, the right October 4th, 1882. The subsequent history of the case, as given by the patient herself, is as follows. For three months the inflammations continued, exactly as before, in each eye, an attack coming on every week. After that they grew more infrequent, and were accompanied by less redness. Gradually all defined attacks ceased, though slight redness would from time to time occur. When I saw her, in February, 1884, there had been no treatment used for fourteen months. Each eye presented a free iridectomy, done upwards. The synechiæ remained as before. Vision was from one-tenth to two-tenths in each eye. Tension normal. Each vitreous slightly hazy, some large floating opacities in the left. Each nerve presented a wide-spread, shallow, physiological excavation.

The patient complained bitterly of intolerance of light, and of inability to accommodate herself to sudden changes of illumination; in short of all the usual disturbing effects of an iridectomy.

Here then we have a case of chronic recurrent iritis, extending over two years and persistent to an unusual degree. We are accidentally enabled to study the effect of an iridectomy on the progress of the disease, which at the time was evidently growing less severe. And while, on the one hand, we cannot but be astonished at the tolerance exhibited by such an iris toward such a serious operation; it must, on the other, be admitted that there was no immediate effect on the disease, and that in all probability the ultimate cessation of the symptoms was due to the fact that the malady had worn itself out, and was self-, rather than artificially, limited. In view of all the circumstances I am unable to persuade myself that the iridectomy did any good here, or would be justified in another similar case.

DISCUSSION.

DR. KNAPP.—Iridectomy in chronic iritis has been frequently made and often resulted badly. There is not the slightest doubt, that in many cases, iritis will relapse for years, but finally get well. I accidentally saw a young lady in this hotel who for five years had many attacks of iritis. She has now perfectly recovered. In some of these cases of recurrent iritis, iridectomy is performed, nevertheless the attacks continue for years. Iridectomy is a remedy, but not a sure one. From the experience which I have had I restrict it to those cases in which, besides the iritis and adhesions, there is a tendency to cyclitis and glaucoma. I think that under such conditions, iridectomy is indicated beyond dispute. As long as the iritis remains simple, with a limited number of adhesions, and a part of the pupil moves freely, I do not, as a rule, perform iridectomy.

I do think that iridectomy is a remedy which if it does not always prevent the attacks, mostly diminishes their frequency, and on the whole, has a good effect. A few years ago the same question came up at the Heidelberg congress, where some of the more experienced oculists took the ground that it favored an extension of the process, and they were much adverse to it. The decision whether or not iridectomy should be performed, depends greatly upon the course and the gravity of the disease.

THREE CASES OF RESTORATION OF THE EYELID BY TRANSPLANTATION OF A FLAP WITHOUT A PEDICLE.

BY CHARLES STEDMAN BULL, M.D.,

NEW YORK.

CASE I.—This patient was a man, aged thirty-two, with complete ectropium of the right upper lid, and entire destruction of the right lower lid and eyeball from a burn. The accident had occurred fourteen months before, hot molten metal having been dashed in his face from a ladle. The whole forehead, temple and cheek were a mass of cicatricial tissue, the lines of contraction running in almost every direction; and this rendered impossible any attempt at re-

storing the eyelids by sliding or twisted flaps. Wolfe's method of transplantation, without pedicle, was deemed the only one applicable to the case, or that gave any promise of success, and the patient consented to the trial being made. The ciliary margin of the upper lid was loosened from its cicatricial attachment to the eyebrow and brought down into its normal place, and was then stitched to the edge of the skin which corresponded to the position of the ciliary margin of the lower lid, and which was adherent to the inferior orbital margin. A piece of skin, one-third larger than the space to be filled, was then marked out on the inner side of the left fore arm, and carefully dissected up, leaving, however, an attachment by a narrow pedicle. The surface of the space to be filled was then prepared by cleaning the surface and staunching the slight flow of blood. The pedicle of the flap was then divided, and the under surface of the flap carefully cleansed of all fat and connective tissue. It was then placed in position, and one end that seemed very redundant was trimmed off. The transplanted flap then measured one inch and three quarters (1¾) in length by an inch and a quarter (1¼) in breadth. One suture was inserted at each end of the flap, and then the entire external surface was covered by a single layer of gold-beater's skin and five layers of iodoform gauze; over this was placed a layer of borated cotton, and then a roller bandage. The dressings were not removed for five days. They were then carefully taken off, and the flap was found united throughout *except at the points of suture*. There had been no suppuration. The same dressing was reapplied and changed every second day for two weeks, and then was entirely discontinued. The flap has somewhat shrunken, and the patient is able to open the eyelids to about two-thirds of the normal width. It is now six months since the operation was performed.

Case II.—This patient was also a man, aged forty-one, a fireman by occupation, who had been burned on the left side of the forehead, nose and left upper eyelid two years before I saw him. The inner two-thirds of the upper lid were everted and anchored to the upper orbital margin. The forehead, nose and cheek were so badly scarred that there was no

hope of any successsful result from sliding or twisted flaps. The everted lid was dissected free from the orbital margin and brought down in place, and stitched to the margin of the lower lid, the edges of both being first freshened. A piece of skin one inch long by three-quarters of an inch wide was then dissected up from the inner side of the left fore arm, and cleaned of all fat and connective tissue, leaving it still attached by a narrow pedicle to the arm. The space to be filled was then prepared for its reception by careful cleansing and the removal of all small clots and shreds of tissue. The pedicle was then divided, and the flap transferred to the vacant space to be filled. As it did not lie quite smoothly, owing to the cicatrices on the side of the nose, six fine sutures of carbolized silk were introduced at different points, in order to maintain the flap in position. This was then covered by a layer of gold-beater's skin; over this were applied four layers of iodoform gauze; over this a layer of borated cotton and a roller bandage. The dressing was not disturbed for four days, and when it was removed, there were several suppurating spots at the suture points. The wound was carefully washed with a one per cent. solution of carbolic acid, and the dressing then reapplied. This was changed and the surface was carefully washed as before, every day for ten days. By this time all suppuration had ceased. The flap had united throughout, and there was no slough.

CASE III.—The patient was a man, aged twenty-three, with complete eversion of the right lower lid from caries and long-continued suppuration of the inferior orbital margin and malar bone. The patient was a marked example of scrofula, and bore the traces of glandular suppuration on both sides of the neck and beneath the angles of the jaws, in deep scars. There had been since boyhood a carious process in the malar bone on the right side, with a fistulous opening leading down to the diseased bone, and from time to time small pieces of bone had come away. No operation had ever been done for the removal of the dead bone and cure of the disease. Gradually the lower lid became everted, until the entire lid margin appeared bound down to the margin of the orbit, or rather to

the malar bone, and the eversion was complete. The fistulous opening had closed about a year before I saw the patient, and had remained so ever since. There was constant epiphora and occasionally a slight muco-purulent discharge. The palpebral conjunctiva was very much thickened, and presented a surface like that in chronic granulations or trachoma. The site of the old fistulous opening was a little to the nasal side of the malar prominence, but the bone-disease had been so long continued that the periosteum had become involved for some distance on all sides, and nearly the entire lid was bound down firmly to the underlying bone, in which there was a perceptible depression caused by loss of substance. The skin covering the cheek and temple was scanty in quantity and but very slightly elastic, so that it was not deemed advisable to attempt filling in the space by a sliding flap from the cheek or a twisted flap from the temple; but it was thought that the best results might be gained by filling the vacant space with a flap of skin taken from a distance by Wolfe's method, although it is well known that this method of operating does not succeed as well in cases of restoration of the lower lid, as where the upper lid is to be restored, mainly owing to a lack of sufficient base support for the transplanted flap. The depressed cicatrix was first separated from its subcutaneous adhesions to the bone by a tenotomy knife, introduced through healthy tissue beyond the margin of the cicatrix. This required some little time and careful manipulation, owing to the extent of the adhesions. It was then found that though the tissues were more movable, the depression and eversion of the lid were as marked as ever. The next step was the excision of all the cicatricial tissue, the first incision being made parallel and very close to the ciliary margin of the lid, throughout its entire length. The lid was then freely movable and was replaced in position. The cicatricial tissue was then carefully excised, and this left a space an inch and a quarter (1¼) long by half an inch wide, to be filled by a transplanted flap. This was marked out on the thin skin covering the anterior wall of the thorax on the right side, the measurements being a quarter of an inch larger

in all directions than the space to be filled. This flap was then dissected up free from all adipose and connective tissue, and carefully fitted to the space in the lower lid, which had been previously prepared for it. A little trimming of the edges was found to be necessary before complete coaptation succeeded. As this was the lower lid with not a very firm base of support, it was thought best to introduce a few sutures to maintain the parts in coaptation, and five stitches of fine carbolized silk were introduced at regular intervals and tied. The flap and surrounding skin were then gently and carefully cleansed by a saturated solution of boric acid, and the entire surface was then covered as in the other cases by a layer of gold-beater's skin, which extended for the distance of an inch on all sides beyond the line of the flap. Over this were applied four layers of iodoform gauze; over this a layer of borated cotton, and then a rather firm roller bandage. The patient was quite prostrated from the effects of the ether, as the operation took about forty-five minutes, but rallied in a few hours and sank into a quiet sleep. The next morning he was very comfortable and complained of no pain. The dressings were not removed till the afternoon of the third day, when the patient complained of a sense of hardness and discomfort in the eyelid. When the flap was exposed, it was found that there was suppuration at all the suture points, and the surface of the transplanted skin had a brownish discoloration, as if about to slough. The parts were thoroughly cleansed with a two per cent. solution of carbolic acid, and carefully dusted with iodoform. The gold-beater's skin, iodoform gauze and borated cotton were then reapplied, and over all a rather loose roller bandage. This was allowed to remain for two days, and when removed there was found a complete slough of the epidermal layer of the flap. The necrotic process, however, had not extended any deeper. Suppuration still continued at three of the suture points, and a small amount of pus exuded on pressure, but the flap was quite firmly adherent. The parts were again cleansed with a two per cent. solution of carbolic acid, and covered with powdered iodoform, gold-beater's skin and iodoform gauze, but

the layer of borated cotton was discontinued, and a loose bandage was applied over all. This dressing was changed and reapplied every day, the parts being carefully cleansed as before. From this time suppuration ceased, and the healing process went on steadily to completion. The sutures were all removed on the sixth day. It is now nearly three months since the operation, and though the process of shrinkage in the flap has not yet ceased, the result of the operation is very satisfactory.

A SUCCESSFUL CASE OF SKIN FLAP TRANSPLANTATION WITHOUT PEDICLE TO LOWER LID, AFTER REMOVAL OF AN EPITHELIOMA.

By B. E. FRYER, M.D.,
KANSAS CITY, MISSOURI.

SUCCESSFUL cases of transplantation of skin flaps from distant parts, without pedicle, have been sufficiently numerous to give the operation a permanent place both in ophthalmic and general surgery. Those who have done the operation in the last few years have not always followed Wolfe who originated it, either in the operative procedure proper, or in the dressing afterwards; and it would seem that especially a simpler and probably a more effective dressing than Wolfe's, as far as the retention of the flap is concerned, has been sought by later operators.

The following is a successful case in which the dressing was increased, it is believed, in its retentive power and simplicity, and lessened in part of its quantity, and to the patient therefore of some of the irksomeness.

CASE.—Mrs. E. P., aged 41; American birth and parentage, of not strong constitution, and not in good health. Had suffered from an epithelioma of left lower eyelid and adjoining part of cheek. The epitheliomatous growth extended from about ¼ of an inch from the inner canthus outwardly to a short distance beyond the external angle. It involved the

tissue of the lid to within $2\frac{1}{2}$ m.m. of the ciliæ, and in one portion included the site of the ciliæ. Its breadth was about $\frac{1}{2}$ of an inch. The disease, which had lasted over a year before I saw the case (which was March 20, 1884), had been treated by an irregular with caustics to aggravation. There was cancerous heredity, and the growth was steadily extending.

I operated March 27, 1884, assisted by my partner, Dr. Tyree, and Dr. Luscher. The patient being under ether, I removed the epithelioma by laying out with a small scalpel the lines of incision about two m.m. beyond the disease, cutting well through the integument, and then excising with scissors all within these lines, and deeply enough to get below the disease. Two or three small arteries were twisted. The eyelids were then brought together by two fine silk sutures. I now had a crescent-shaped wound $1\frac{1}{4}$ inches long and $\frac{3}{4}$ inch at greatest breadth.

Laying out with a scalpel a flap on the left forearm of very nearly twice the size of the wound, but leaving at one point of the crescent a portion uncut (as was done by my friend Dr. Gruening in his operation), I turned the flap over on itself, and with scissors curved on the flat, removed all the subcutaneous tissue and fat, and then dividing the uncut portion, placed the graft, which fitted very accurately, at once in position in the wound, and molded it into place by gentle pressure. I then applied a layer of gold-beater's skin *plaster*, the adhesive surface of which had been moistened, and gently pressed it into the hollows and irregularities of surface, using a compress of absorbent cotton dipped in water about 100° Fah. to make the pressure with. I then placed a second layer of the plaster over this, and again made slight pressure to mold both layers together into position. The first layer extended an inch above and $1\frac{1}{2}$ inches below the eye, and about $\frac{1}{2}$ inch beyond the eye laterally; the second layer somewhat less.

I was able to see through the double plaster that the flap was not only closely adjusted, but that the edges of the flap and of the wound were in apposition; which latter is, I believe, of much importance. As the plaster became dry I found I

had a firm dressing, one which would hold the graft and the tissues surrounding it in a splint as it were.

The operation was performed in my office; and as the patient lived some three miles away, and as the weather was cold, I placed a small portion of absorbent cotton over the plaster, and held this with a bandage. But the cotton and bandage were not kept applied by the patient on reaching home. Nor would I, in doing the operation in future in warm weather, or at the patient's residence, consider any other dressing than the gold-beater's skin plaster essential.

The patient was seen at her house daily for four days, and on the seventh day after the operation she came to my office and I removed a portion of the plaster and both of the sutures holding the lids, and found perfect union of the graft, of which one portion only, viz. the inner, was slightly above the surrounding surface. On the eighth day the remaining portion of the plaster was removed. A slight desquamation of a portion of the epithelium of the graft, not exceeding $\frac{1}{6}$, took place afterwards, but a new layer was soon formed and healing completed.

It is now three months since the operation was done, and the graft resembles very closely surrounding surface. There has been but slight contraction.

The case was exhibited before the Kansas State Medical Society at the last annual meeting, May 20, 1884.

CASE OF GANGRENE OF THE LIDS, WITH SUBSEQUENT RESTORATION OF TISSUE WITHOUT PLASTIC OPERATION.

BY RICHARD H. DERBY, M.D.,
NEW YORK.

IT seems to me that in connection with the papers which have been read on Wolfe's operation, the following case is not without interest, illustrating, as it does, how efficiently nature herself replaces lost tissue without the assistance of the surgeon's knife.

On November 17, 1883, there came to me E. M., aged forty-eight, a man of ordinarily rugged health. His story was, that two weeks previously, for no known cause, he first noticed a black spot beneath the right lower lid. The next day the eye was closed, and the parts adjacent swollen. The case was regarded as one of erysipelas, and it was so treated. When the patient came under my observation the right upper and lower eyelid, from the margin of the orbit below nearly to the line of the eye-brow above, was transformed to a black slough, with marked line of demarcation from the adjacent reddened thickened skin. In the midst of this black slough the ciliary margin of the upper lid still remained apparently intact. With difficulty the eyeball was seen, and found uninjured. The swelling of the surrounding tissues extended over temple and back to ear.

Patient was transferred to Bellevue Hospital, and a month later he again came under my observation. There was now cicatricial tissue occupying the region of the slough, there was incomplete eversion of both upper and lower lid, the right eye-brow was drawn downward 2 ctm. lower than the left. Patient had now the power to partly open and completely close the lids. The very extensive gangrene in this case, involving, as

it did, nearly the complete upper and lower eye-lids, the subsequent restoration of the parts without any treatment whatever, seem to me matters of great interest. In Wolfe's operation it has been more than once noticed that while the transported flap has shrunken to very slight dimensions, yet an improvement in the condition of the parts has been observed. May the history of the above case possibly throw some light on what takes place in such cases?

DISCUSSION.

DR. POOLEY.—It seems to me that Dr. Derby's case in this connection is of unusual interest. I have noticed after Wolfe's method, even where the flap has entirely sloughed, that the restoration of the parts to a natural appearance was very remarkable. It seems to me in these operative procedures, that the complete removal of the growth would be nearly as good for the defect as though a flap were taken from some distant part. In some cases, the contraction is so great, that little of the transplanted material remains.

DR. PROUT.—I had a case at the Brooklyn Eye and Ear Hospital very similar in its beginning to that described by Dr. Derby. Two months ago a young girl came to me with the lids of the right eye stiffly swollen (diphtheritic conjunctivitis could not have caused a more brawny condition), and two or three points indicating commencing gangrene. Before commencing treatment, it seemed to me essential to see the eye, but it was impossible without an anæsthetic to do so. I therefore gave ether, and, finding that the eyeball was unaffected, then treated the case. She returned in a few days, and I did not recognize her. There was no loss of tissue; the eye-lids were soft and movable. I attribute the result largely to the method of treatment and the dressing. The point which I have in my mind is, that the least perturbative treatment of diseased conditions is the best. The dressing employed in the above case is prepared as follows:

℞ Acidi Boracici vel Sodii Biboratis, gr. xv.
Tincturæ Opii.,
Glycerini, āā ℥ij.
Aquæ Camphoræ, ℥iv. Mix.

This is applied warm on lint, over which is placed a layer of rubber-tissue, and then over the rubber a pad of cotton-wadding and a bandage—so as to maintain heat and moisture.

This in local inflammations will give better results than I have obtained by means of other treatment.

Dr. Harlan.—I have had a favorable experience in maintaining the life of the flap by dry heat. In an operation for restoration of the upper eye-lid, I used a flap with a narrow pedicle. The next day the whole epidermis was dead, and we had no hope of its restoration. At that time I ordered dry heat with absorbent cotton. Large handfuls were heated at the stove, and applied continuously day and night. Improvement commenced at once. There was almost complete restoration of the lid, and the result was unusually good.

Dr. Little.—I saw a case in the Jefferson Hospital of a man who had been struck on the upper eye-lid with the end of a spoon. A few days later the lid was much inflamed, presenting a ring of necrotic process, the size of the hollow cylinder with which it had been stamped. Sloughing occurred and contraction followed, so that the upper eye-lid was drawn up, exposing the cornea, and making it necessary that he should use means to protect the cornea prior to an operation.

Dr. Howe.—Much interest attaches to these cases. I have had occasion to compare some cases reported here. It seems to me that so much importance does not depend on the dressing, but I think we need to choose the cases with a good deal of exactness. In the third case reported by Dr. Bull, the cicatrix was so dense and hard that there were evident disadvantages to begin with. Such cases, especially when involving the lower lid, we cannot include. After the flap is made, a good deal depends on getting it clean. I was struck with that in a case which I reported some three or four years ago. There was considerable oozing from the surface for some time afterwards. Much depends on the perfect coaptation of the parts. Dr. Bull did not mention whether or not he sewed one lid to the other. If this is not done, the circular muscle will move the flap considerably. The quieter the part is kept, the better will it be, and motion may be obviated by sewing the lids together. It seems to me that these points are of more importance than the subsequent dressing.

Finally, as to shrinking. This is very great in these cases. In one case which I saw, the contraction one year after the operation was very considerable.

Dr. Andrews.—I have always thought that the dressing was one of the most important features in the treatment of these cases. Dr. Fryer has stated that he would apply gold-beater's skin plaster, without anything else. In the case which I reported to this Society last year, I employed gold-beater's

plaster without any sutures ; but I kept up gentle compression by means of a bandage. There are, however, cases in which a large flap is required, where it is desirable to employ sutures, but in such cases I do not use silk or cotton. I always aim to avoid suppuration at the point of the sutures, because this interferes with the healing of the wound. Suppuration does not occur so frequently where fine cat-gut sutures are employed. I think that the same rule would apply to the treatment of these cases as holds good in the removal of large sebaceous tumors of the scalp. In such cases there is a great redundancy of tissue, and if the compress bandage is omitted there will be sloughing.

Dr. Lippincott.—I wish to refer to a case which I saw five years ago, showing the advantage of suturing the lids without a flap. There was sloughing of the lid and the face from bichloride of mercury, leaving but little healthy skin. One lid was strongly everted and attached to the supraorbital ridge, and the other was shortened. I dissected the everted lid free and sutured the lids together, passing stitches one-eighth of an inch apart. I tried skin grafting, but that failed. The result was very good. The symblepharon continued for about twelve months, at the end of which time there remained a very useful and not unsightly upper lid, showing no tendency to eversion.

Dr. Fryer.—In regard to contraction of the flaps after operation, I suppose the contraction will vary with the character of the tissue beneath the flap. Where there is adherent, cicatricial tissue below, dense and firm, there would very likely be a great amount of contraction after the flap had healed ; the tissues contracting beneath the flap will draw it together. In regard to the necessity for a pad or compress after this operation, I would say, that with a double layer of gold-beater's skin plaster you have as good a splint as can be had, and it seems to me that no pressure is needed. I watched the drying of the plaster for some time, and tested the condition of the dressing, and was satisfied that I could get along without any addition to it.

Dr. Green.—In the report of these cases, as in those reported by Wolfe, it appears that where the sutures have been placed there has been more or less of suppuration. The conclusion seems to be that, wherever it is possible, it is better to avoid the use of sutures in such cases. But it is also important that the margins of the skin be placed in good coaptation. As the use of sutures is attended with so much danger from suppuration, it would seem better to substitute for them small strips of some unirritating plaster.

DR. WADSWORTH.—With reference to the remarks of Dr. Green on the use of the sutures. In the case which I first reported there were two sutures, and there was no suppuration. The sutures were, however, very fine, and they were placed only through the horny layer of the flap and skin. They were intended only to keep the flap in place where there was a double curve, until the dressing could be applied. Such sutures as that may be used without danger.

DR. GREEN.—I do not condemn such sutures as that.

CASE OF HYSTERICAL MONOCULAR BLINDNESS, WITH VIOLENT BLEPHAROSPASM AND MYDRIASIS—ALL RELIEVED BY MENTAL IMPRESSION.

BY GEO. C. HARLAN, M.D.,
PHILADELPHIA, PA.

L. D.—sixteen years of age—first came under observation September 24, 1883, at the throat department of the Philadelphia Polyclinic, under the charge of Dr. S. Solis-Cohen, where she applied for relief of distressing symptoms caused by the development of a fungous growth upon the tonsillar mucous membrane.

Having been thus initiated in the charms of medical treatment, she was, on Dec. 26th, on account of the development of various nervous symptoms, referred to the nervous department under Dr. Mills, who has furnished me with the following record of the case. "She was taken sick last September with sore throat, and was confined to the house for about two weeks. She was very weak during this attack. Dr. Cohen attended her, and there was some doubt about the throat difficulty being diphtheria, but this throat trouble was followed by difficulty in swallowing and regurgitation of food through the nose. At the same time there was noticed a gradual weakness of sight in the right eye. After these troubles had somewhat lessened, huskiness of the voice came on and was soon followed by complete loss of the voice.

"Five or six weeks ago she had pleuro-pneumonia, and during the attack her arms became partially paralyzed. She complains that there is a numbness down her leg and in her feet, and that she does not feel the ground under her when she walks.

"Her arms are now perfectly well, but her feet are in the same numb condition.

"She has a peculiar choreaic twitching of the muscles of the face, more marked on the right side.

"The patient states that at seven years of age she had fits, and that these fits continued about every four weeks until she was ten years of age. It is said that she frothed at the mouth, but has never bitten her tongue and has never fallen or injured herself. Has never had the spell while alone, there was always some one with her when it happened.

"June 18, 1884. Six days ago she began to have pain on the left side of the neck, and two days later had complete spasmodic torticollis of left side, her head being bent over to left shoulder."

The next record is by Dr. S. Solis-Cohen.

"I found L. at the clinic, crying because one of the assistants in the nervous department had informed her she would never be cured. I assured her that recovery was possible, and told her that if she would come to my office, I would try the effect of a very powerful magnet, which I was convinced would succeed in calming the facial spasm. She came to the office, and I applied one pole of a Charcot magnet in front of the ear, at or about the emergence of the facial nerve, placing the other pole on any convenient spot. To my amazement, the spasms on the side of the face touched by the magnet were greatly lessened in frequency and extent. The other side was then operated on in a similar manner. After a week's daily treatment the spasms ceased entirely, and did not return until a short time ago, when she became the subject of an acute conjunctivitis.

"Shortly after the cessation of the spasms, L. came to me complaining of various aberrations of vision, and a fixed dilatation of the pupil. I asked Dr. Hansell, under whose care I

had placed her when the first paralysis of accommodation had occurred, to allow me to try the effect of the magnet upon the eye."

When the patient was transferred to the Eye department, October 25, 1883, Dr. Hansell, the chief of clinic, noticed no other defect than a moderate degree of H.as., headache after use of the eyes, and failure of accommodation. O.D. with +1.25 cyl. ax. 90° $\frac{20}{20}$, O.S. with +.50 cyl. ax. 90° $\frac{20}{20}$. Pupils responsive and ophthalmoscopic appearances perfectly normal.

There was no material change until November 7th, when homonymous diplopia of 2° appeared.

December 22d, she had been ill in bed for two or three weeks, and discovered, on getting up, that the reading power of the right eye was lost. She could read with the right eye only No. 18 Snellen, and not nearer than 14". The pupil was slightly dilated, and reacted imperfectly to light. Field of vision normal. The left eye was normal, with full vision, and accommodation = $\frac{1}{4}$. There was distressing blepharospasm on the right side, and slight twitching on the left.

January 14th, accommodation was entirely suspended in the right eye, vision only = $\frac{15}{60}$, pupil dilated, and field of vision concentrically limited. Blepharospasm increased. Left eye still normal.

On March 17th, a central scotoma in the right eye was noted.

After this her symptoms continued, with more or less variation, until the right eye became entirely blind, except to light, the pupil was widely dilated and fixed, and the muscular spasms became more violent and extended to the face and neck.

On entering the room of the Dispensary one day early in May, I was surprised to find L. sitting there with the muscles of her face completely calm, and still more surprised to be told that Dr. Cohen had brought about this result by the use of a magnet. Also that the pupil was contracted after the application, and vision sometimes partially and temporarily restored. This at once aroused strong suspicion of simulation, though the prism test had been carefully applied with negative result. I had her sent to my office for further exami-

nation, and, on May 17th, applied the simple test described at the meeting of this Society in 1882. This, it may be remembered, consists in placing a pair of convex glasses before the eyes—a weak one in front of the blind eye and one too strong to read through in front of the sound eye. She insisted positively that the right eye could see only diffused light, and could not discern the largest and most familiar object. With a +3 D. glass before the right eye and a +18 D. before the left, she read No. 4 Snellen without hesitation at about eleven inches. For fear of exciting her suspicion, no attempt to test the accommodation was made at that time.

On May 22d, the examination was repeated. She again insisted that with the right eye she could distinguish only light, which she said was of a dazzling character. The pupil of that eye was widely dilated and fixed. With +3 D. before the right eye and +18 D. before the left, she read No. 2½ Snellen. On attempting to test her accommodation, she denied being able to read when the print was brought nearer than fourteen inches—which is about what would be expected from the state of the refraction, supposing the accommodation to be entirely suppressed.

On May 24th, I was present when the Charcot magnet was applied by Dr. S. Solis-Cohen. A slight blepharospasm, which existed before the application, was relieved, but there was no effect upon the pupil or upon vision. The next day, however, the pupil, though not normal, was decidedly smaller than before, and, with the correction of her astigmatism, she admitted a vision of $\frac{20}{80}$. With +3 D. before the right eye and +18 D. before the left she again read 2½ S., but not nearer than 13″.

May 28th, the magnet was again applied by Dr. Cohen at 4½ P.M., and the patient was sent directly to my office. No effect was noticed on the pupil at first, but an hour afterwards it was slightly, though decidedly, less dilated. The next day, however, it was very much less dilated, though still larger than the left, and responded to light. With the astigmatism corrected she admitted a vision of $\frac{20}{15}$. The left eye, without glass, $\frac{20}{15}$. With +3 D. and +18 D., as before, she read 2½ S., but not nearer than 12″.

June 19th, she had a severe attack of conjunctivitis in the left eye, and stated that she could not then read ordinary print with that eye, and could see only diffused light with the right. The left pupil was normal, the right widely dilated and rigid. With O.D. +3 D. and O.S. +18 D., read No. 14 S. with difficulty, but best at about 14″.

I now determined to try the effect of unmagnetized iron having the same form and appearance as the magnet, but, at the suggestion of Dr. Cohen, had the false magnet made of wood, with iron tips to give metallic impression upon the skin.

Messrs. Queen & Co. made for me a very perfect imitation, and it was placed in the same drawer in Dr. Cohen's office where the original was always kept.

July 1st, at noon, the left pupil was of normal size, and freely responsive; the right was widely dilated, almost ad maximum, and perfectly rigid when exposed to bright light. There was slight blepharospasm and some twitching of the muscles of the face on the right side.

She was sent to Dr. Cohen at four o'clock in the afternoon, and he noticed the same condition as at noon. He applied the imitation magnet, and sent the patient directly to my office. When she left him the face was calm, but the pupil still dilated. I examined her at once, and found the muscles of the face quite normal, and the right pupil of the same size as the other, and freely responsive to light. The only difference between the action of the Charcot magnet and of the Cohen-Harlan magnet was that the latter was more prompt and complete in its effects—probably on account of a little more parade in its application.

Some further notes by Dr. Cohen show that the uses of the wooden magnet are not confined to ophthalmology, but that it has a place in general surgery. "During June the patient fell, and said she dislocated her elbow joint. She was treated for dislocation by a practitioner called in the emergency. July 1st, this gentleman having discharged her with a stiff arm flexed at the elbow, which he said he was unable to straighten, I examined it, found no dislocation, and straightened it by

simple extension. A hypersensitive point was discovered by pressure on the ulnar notch.

"I asked her to report at the surgical department of the Polyclinic for examination of her arm, in order to secure a verification of my opinion that there had never been a dislocation. July 3d, she called on Dr. Steinbach with her forearm again rigidly flexed upon the arm. Dr. S., unaware of her history, yet recognized the nature of her trouble, and finding himself unable to overcome the spasm of the biceps, which he describes as extreme, the tendons standing out like whipcords, proposed to give her ether. She declined to take the anæsthetic, and came to my brother's office during my absence. He applied the wooden magnet to the biceps, and the spasm relaxed at once."

NEURO-RETINITIS, WITH ALMOST SUDDEN LOSS OF SIGHT IN BOTH EYES.

By H. KNAPP, M.D.,
NEW YORK.

DURING the last year two cases of almost sudden loss of sight in both eyes, with the picture of optic neuritis, came under my observation. In the one the blindness remained permanent, with the exception of a small island in the visual field of the right eye; in the other case, sight was perfectly restored in both eyes. The blindness in both cases was binocular and absolute, with complete immobility of the pupils on changes of light, in the first case for several months, in the second for three days. There is nothing very unusual in the recovery of sight after neuro-retinitis from meningitis and other diseases, much less unusual is the permanence of blindness after neuro-retinitis; but total blindness occurring in the course of several hours, being accompanied by nothing but choked disc—constitutional diseases, such as albuminuria, diabetes, syphilis and the like being absent—is certainly very rare. In my own practice I do not, at this moment, recollect

any other cases, and the literature on the subject is so meagre[1] that the communication of the above mentioned cases may not be without interest to the members of this Society and the readers of our transactions. The cases were as follows:

CASE I.—N. St., aged forty, of New York, a gentleman strong, healthy, and temperate all his life, with no constitutional disorder, married, having three healthy children, suffered on May 5, 1883, intense headache and nausea. In the evening he noticed that his sight became dim. He slept well during the night, but when he awoke the next morning he found that he was totally blind in both eyes. His family physician, Dr. Wiener, called me in consultation in the afternoon of the same day, May 6th. I found the patient free from pain and fever, his sensorium undisturbed, his appetite good, his general condition excellent, no abnormity of motion or sensation in any part of his body, but he had passed no water during the whole day. Percussion showed an empty bladder, and catheterization voided only about fifteen grms. of urine. The external appearance of his eyes showed nothing abnormal, except wide pupils, which were perfectly irresponsive to light. No perception of light in any part of the visual field in either eye. Mobility and tension of both, normal. The media perfectly clear. The anterior chambers of ordinary depth. In both eyes the well marked picture of choked disc, with slight whitish opacity of the adjacent retina. The retinal veins rather large and tortuous, the arteries small, not pulsating on pressure upon the globe. No hemorrhages, no white patches in the fundus.

The sudden blindness, preceded by headache and nausea, the neuro-retinitis and the suppression of urine, seemed to warrant the diagnosis of an uræmic attack, though the tests for albumen and sugar in the small quantity of urine were negative.

We ordered salicylate of soda in 0.60 capsules, one to be

[1] Compare THEO. LEBER, in Græfe-Sæmisch's Handbuch, vol. v. pp. 813-816: Acute Neuritis, without assignable cause or of rheumatic origin.

A. V. GRÆFE: Über Neuro-retinitis u. gewisse Fälle fulminirender Erblindung.—Græfe's Arch. Bd. xii., Abth 2, p. 114.

taken every quarter of an hour until profuse perspiration occurred, which was to be kept up for two hours by drinking hot tea. He took four capsules, and perspired freely.

The next day, May 7th, the patient felt better. The urine had still to be taken by the catheter, and was no more in quantity than about thirty grms., containing neither albumen nor sugar, and was free from casts. Choked disc as distinctly marked as in cases of cerebral tumor; arteries small, not pulsating on pressure; veins large, very dark. Pupils immovable. Blindness absolute. Diaphoresis again as the day before; dry cups to temples.

The following day, May 8th, the patient passed more urine. The eyes were the same, yet the arteries were more filled, but did not pulsate on pressure. Dr. W. H. Draper, who was called in consultation, carefully examined the heart and the other organs of the body, but could detect no abnormity. He also thought that an uræmic attack was the most probable diagnosis, in spite of the negative result of the examination of the urine. Salicylate of soda continued.

On the fifth day, May 10th, the patient was somnolent for a few hours, but passed more urine.

On the sixth day his pupils were somewhat narrower. The arteries of the right eye pulsated on pressure, those of the left eye did not. No perception of light. Ordered iodide of potassium 0.60, and calomel 0.005, three times daily. Dr. C. R. Agnew, who was called in consultation, shared our opinion of the probability of an uræmic attack.

May 13th, the discs began to become pale; otherwise there was no change in the condition of the patient. The retinal arteries pulsated readily on pressure; the patient passed urine freely, and felt quite well. Blindness still absolute, and pupils immovable. Treatment: Hypodermic injections of strychnia, electricity, milk punch, generous diet. During the next two weeks the general condition of the patient continued good, the urine was normal in quantity and quality. The optic discs gradually became flat and pale; the arteries were better filled, and pulsated readily on pressure; the veins were normal. Apart from the condition of the disc, nothing unusual in respect of the fundus.

On June 1st the patient alleged that he saw light for a short time; the same repeatedly during the next weeks, but on examination I was never able to verify it. The optic discs gradually assumed the aspect of plain atrophy.

On June 29th, fifty-five days after the onset of the disease, the patient was examined, in consultation, by Dr. A. L. Loomis. He stated that he still saw glimpses of light occasionally, and had some tingling and numbness in the left hand and leg. Dr. Loomis thought that there must be some cerebro-spinal lesion, which later would come out more distinctly. Large doses of iodide of potassium were ordered.

On September 25th, 1883, I saw the patient in consultation with Dr. Janeway and Dr. Higgins, the latter having had charge of the patient for the preceding five weeks. I still found the pupils immovable, no perception of light, and the optic discs perfectly atroptic. A definite diagnosis was not arrived at.

Since that time Dr. Higgins has treated the patient with mercurials, salivated him repeatedly, used iodide of potassium, and blisters behind the ears.

Not having heard anything of the patient for months, I was anxious to know how he had been, and asked for the permission to examine him again, which was granted, under the condition that I used neither the ophthalmoscope nor a light to test the sight. The patient's brother, a very intelligent and sensible man, told me that the patient had felt well, went daily to his place of business, could not walk alone, but could see and recognize objects which were in a certain direction before the right eye, better when they were far off than near by. The left eye was completely blind.

When I visited the patient, on July 10, 1884, I could verify these statements. I found him somewhat emaciated, otherwise healthy and strong. No mental or bodily disturbance; in particular, no abnormity of sensibility or mobility; his senses, except that of sight, were normal. His pupils were large and immovable. In the left eye he had no perception of light: with the right he could not tell where the window was, but when his face was turned towards it, he stated correctly and without fail, when the right eye was shaded or left

free. Objects held in a certain position, on the nasal side near the point of fixation, and no nearer than two feet from his eye, he made out distinctly; for instance, he recognized the figures on playing-cards correctly, counted the number of black spades, or red hearts, without a mistake, and read numbers of the size of Sn. L. at a distance of two feet. He could also distinguish colored figures from black, but could not recognize the colors. The return of sight, he stated, had begun about five months previously, that is ten months after the onset of the blindness.

CASE II.—Caroline L., aged eleven years six months, a healthy-looking girl, was brought to my office on April 1, 1884, by her father, who gave me the following history. She had always been well. During the last five or six days she had several times had temporary obscurations of her visual field. Three days ago she fell down with a baby which she had on her arm. Neither the baby nor she was injured, yet she had a great fright, and, for a few minutes, everything around her appeared dark. Two days ago, in the forenoon, by spells it seemed to be as dark to her as if it were night. At 3 P.M. the left eye had become blind. She went to bed in the evening, slept well, and when she awoke the next morning she was still totally blind in the left eye, and with the right eye she could see only the objects in the lower part of her visual field. Towards noon the right eye also had become totally blind. Early this morning she could see a little with the right eye.

At 9.15 A.M. I found both pupils of medium size, immovable. S. = O. in each eye. Media clear. Both discs swollen, margins ill defined, arteries small, veins large, dark, easily emptied by external pressure, which caused the arteries of the disc to pulsate. Outward appearance, tension, mobility and sensibility normal. Urine normal in quantity and chemical composition, as examined by her physician, Dr. Seybolt. Spec. gravity 1020. No headache nor any other morbid symptom on the part of the brain or any organ of the body.

I advised the father to take her to the New York Ophthalmic and Aural Institute, where I at once put her to bed, and made her perspire profusely by the administration of salicylate

of soda, 2.40 grms. in the course of an hour. Besides that I ordered 0.01 of calomel every hour.

The next day, April 2d, her condition was unchanged. She had had excessive diarrhœa, about twenty-four stools in twenty four hours. She felt somewhat exhausted, but otherwise well. She had no perception of light, the pupils did not react, and the discs were choked as the day before. Calomel discontinued. Diaphoresis repeated.

April 3d. She perceives the light faintly, and the pupils move sluggishly but distinctly. Interior of eyes unchanged.

April 4th.—Perception of light and mobility of pupils increased.

April 5th.—Counts fingers at the distance of a foot.

April 7th.—Counts fingers at several feet; field of vision of normal extent. Pupils responsive.

Diaphoresis every day, and calomel 0.005 three times daily. One or several stools daily. Optic disc less swollen.

April 10th.—S. $\frac{20}{200}$. Pupils active and of normal size.

April 13th.—Optic neuritis greatly improved, discs somewhat pale, outlines distinct, veins large and somewhat tortuous.

April 17th.—Improvement continues. No pain anywhere. Has been kept in bed all the time.

April 23d.—Vision steadily improving. Optic discs clearly defined, swelling disappeared.

April 28th.—Completely recovered. V. R. $\frac{20}{30}$ —, L. $\frac{20}{30}$. Discharged May 1st.

Ten days later, V. $\frac{20}{20}$ in each eye, F. and accommodation normal. Optic discs pale, atrophic looking.

When last seen, at the end of June, she was completely well, her sight as good as ever, and aside from the distinct atrophic appearance of the optic discs, nothing abnormal could be detected in either eye.

DISCUSSION.

Dr. Kipp.—I have been taught to attribute optic neuritis to a cerebral lesion, but I have seen cases in which atrophy followed optic neuritis, where the patient lived for many years without showing the slightest cerebral disturbance. I have in

mind a case which I saw fifteen years ago. There was choked disc, but no cerebral disease could be discovered. There were symptoms of mental disturbance, but the man recovered health, although he has been blind ever since. As far as I know, disease of the brain, if sufficiently severe to cause such lesions, is rarely cured.

It is also supposed that the optic neuritis is double in cases in which it is caused by brain disease. I have lately seen a case which contradicts this theory. A young man in robust health, while working in a factory, one afternoon fell in a fit. When he came out of the fit, he was blind in one eye. Examination showed a marked choked disc in that eye. The other eye was healthy.

In young girls with amenorrhœa, I have seen sudden blindness with choked disc, the patients remaining blind, but showing no evidence of cerebral disease.

DR. KNAPP.—We know that there may be a great deal of cerebral disease in the frontal lobes without producing any marked symptoms. A large abscess, for instance, may be there for a long time without symptoms of any disease; it may even lead to death without being suspected. I have treated and described a marked case of this kind with Dr. Seguin. An abscess of the frontal lobe, propagated from the frontal sinus, was found at the autopsy. There had been no functional disturbance.

In regard to Dr. Kipp's case, it seems very much like a case of lesion of the optic nerve.

DR. KIPP.—I have watched a case for fifteen years. The man is still in good health. It is not likely that disease of the frontal lobe should exist for so long a time without producing some symptoms.

DR. ANDREWS.—I should like to ask Dr. Knapp whether he attributed the neuritis in the second case to the pressure of some growth on the cavernous sinus, and whether there were any evidences of obstruction, such as swelling of the lids, etc.?

DR. KNAPP.—None whatever. I only mentioned this as one of the causes of pressure. I did not attribute the trouble to it.

DR. HARLAN.—I have examined the inmates of the Pennsylvania Institute for the Blind and have found a number of cases of blindness with atrophy of the optic nerve, and yet the subjects were in good health. In most of these cases there had been cerebral symptoms at the time of the attack.

DR. HOWE.—I would ask Dr. Knapp why it is that, if these little islets of sound tissue remain, the patient cannot point to the objects at once?

Dr. Knapp.—The field seems to be very small, and owing to the patient's imperfect vision, it may be very difficult for him and the physician to find the islet. It is only when a well illuminated object comes into this islet that the patient is able to see it.

Dr. Pooley.—I have observed in quinine amaurosis that the patients could see better at a distance than near.

Dr. Wadsworth.—There is a condition in which we not infrequently meet with something analogous to the small islet mentioned by Dr. Knapp, in retino-choroiditis, where there are often a number of such islets, and where the patient must move the eyes about to get the point with which he sees best. With regard to the question of cerebral disease sometimes existing without marked symptoms, I should certainly agree with Dr. Knapp. I have seen cases in which the cerebral symptoms were limited mainly to slight headache and optic neuritis, and in which the patient has recovered and continued well for a series of years, but with permanent defect of vision. In many such cases I believe there is a meningitis, which later definitely subsides.

Dr. Knapp.—A child of three years of age was brought to me with strabismus. She moved the eyes tolerably well, but when I examined them with the ophthalmoscope, I found double optic neuritis. I found paresis of the external rectus muscle, which had existed for five or six months. By the way, I never operate for strabismus without examining the eyes with the ophthalmoscope, especially the region of the yellow spot.

Dr. Alt.—Dr. Knapp stated that grave lesions may exist in the anterior lobes of the brain without any visible symptoms. That such grave lesions may for a long time exist in other parts of the central nervous apparatus, without being recognized, is shown by the following case, which I had the opportunity of examining. A girl of eleven years of age had been complaining of slight headache for a good while, and a diagnosis of malaria had been made. One day it was found that she could not see as well as usual, and, on examination, I found choked discs. There was neuro-retinitis with large hemorrhages in both eyes. I thought that the diagnosis was either chronic cerebro-spinal meningitis or tumor; and from the symptoms I thought that the chances were in favor of a tumor. In the following month, tenderness over the spine developed. The child got worse, and soon there was paralysis of the lower extremities and of the bladder. Large doses of iodide of potassium were given, and other alteratives were

used. The child gradually recovered, and is now in perfect health. There is total atrophy of both optic nerves. In this case the symptoms pointing to a grave disease of the brain were not marked enough for diagnosis for a period of several months.

DR. KIPP.—This is a subject in which I am much interested, and I wish to put myself rightly on record. I do not mean to say that cerebral disease does not cause optic neuritis, I am sure that it often does.

HEREDITARY ATROPHY OF THE OPTIC NERVES.

BY W. F. NORRIS, M.D.,
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SINCE I presented to the Society, in 1881, a paper describing the history of a family in which Atrophy of the Optic Nerves was hereditary, and of which two members submitted themselves to me for examination, I have again encountered another group of individuals exhibiting this remarkable affection: a family of seven children, all of whom, as well as their parents, I had an opportunity of carefully examining. Every child was affected, while the parents had perfectly healthy eyes. According to their intelligent account of the affection, it extended back on the mother's side; the disease attacking the great-grandmother, a granduncle, two uncles and several cousins. It is unusual to have an opportunity to study such a group of cases at various ages and in various stages of the disease, thus enabling us better to appreciate the progress of the malady. It is well known amongst breeders of animals that the phenomenon of atavism, or the transmission of qualities of a progenitor which first develop in the second generation, is frequent. We, as students of diseases of the eyes, occasionally have an opportunity of witnessing the same law in the inheritance of perverted nutrition of the tissues of these organs. Our most frequent opportunity of studying transmitted disease is, however, undoubtedly where the transmission is direct from parent to offspring, as in the case of that

form of Interstitial Keratitis due to hereditary syphilis. Here, as well known, the disease usually remains limited to the cornea, although it may secondarily invade adjacent tissues. This we can readily understand, when we consider the peculiar anatomical construction of the diseased tissue, so different from that of the contiguous structures. We cannot, however, so easily comprehend why certain delicate nerve fibres of the optic nerve and retina which are in a state of œdematous swelling with proliferation of the surrounding connective tissue should for so long a period of years exhibit such well marked pathological changes, notwithstanding that the adjacent fibres, which have a common anatomical structure as well as a common lymph and blood supply, remain comparatively unaffected.

Are we to consider that these pathological phenomena are a manifestation of a local force treasured up in the cells of the tissue itself, or of perverted energy lurking in the distant but corresponding cells of the central nervous system? The manifestations of the disease under consideration begin with the formation of central scotomata, first for color only, so slight that the different hues, though dimmed in intensity, are still readily recognized. The defect gradually progresses until a complete scotoma both for form and light is developed. The peripheral parts of the retina are affected later, and when they are involved, often lose to a marked degree their sensibility to color, but rarely to form and light. Although the patient is debarred by reason of his loss of macular vision and his color-blindness from most useful and remunerative occupations, he still retains sufficient peripheral sight to guide himself and to do a certain amount of coarse work.

The following are the clinical histories of those of the family coming under my immediate supervision.

Case I.—On the 21st day of June, 1883, Andrew S., aged fourteen years, applied to me, with the statement that for the past year, the sight of both eyes had been gradually failing, accompanied by frontal headaches and dizziness. No history of any general sickness. He asserted that a sister, eight years older than himself, had suffered from the same af-

fection, but that she had become so much better as to be enabled to read again. (This assertion induced me to inquire further into the history of the family, and to make endeavors to examine the eyes of the various members.)

Vision with the right eye was $\frac{3}{60}$: with the left eye but $\frac{1}{60}$. No obtainable accommodation by the ordinary test types. Ophthalmoscope showed that the disc of the right eye was vertical-oval in shape, six by seven diameters in apparent size, and red-gray in tint. Scleral ring continuous around it, with an annular pigment-massing beyond. Marked opacity of the lymph sheaths, especially along the larger retinal vessels, which themselves were contracted. Hypermetropia between two and three dioptrics. The disc of the left eye was about the same size and shape as its fellow, although it was much more atrophic; it being almost devoid of capillarity in its outer half. Intense retinal striation all around it, nowhere hiding its outlines, through which could be seen a black conus to its nasal side, and an irregular black pigment line to its temporal side. In neither eye were there any splotches nor hæmorrhages. No changes in the macular regions. Media perfectly clear. Fields carefully taken[1] and color-blindness determined. Ordered the one thirty-second of a grain of sulphate of strychnia, three times daily, after meals.

On June 2d, and 19th; July 2d, and August 13th; vision slightly bettered. Upon the last date patient came with gold rings in the lobes of his ears. He said that his father had pierced the ears in the hope that it would cause the eye difficulty to lessen.

October 11th.—O.D. V. $= \frac{2}{60}$. O.S. V. $= \frac{3}{60}$. With each eye separately or combined, patient was unable to read any type, although he held all of the tests at about nine inches distance from the eye.

On October 28th, the patient said that he had taken the medicine regularly. He had had some frontal headache. The ophthalmoscope showed that the left nerve was still the more atrophic. This condition, as before, was more marked to the

[1] See chart of visual fields.

temporal side. The "patellar-tendon" reflexes were found to be equal and very prompt, although the legs were held stiff. Claimed that his sight became fogged after he had been doing work sufficiently hard to cause him to perspire. This fogging gradually ceased in about an hour's time. He was sure that it was not dependent upon water getting in front of his eyes. In most instances there was headache coming on at the time. Complained that the fingers got numb, oftener on the left side.

January 8, 1884. Vision the same as at last determination. Ophthalmoscope showed the left nerve still the more atrophic. Had not been taking any medicine.

January 30th.—O.D. V. $= \frac{2}{60}$. O.S. V. $= \frac{3}{60}$. "Patellar-tendon" reflexes the same on both sides. No medicine taken. Eye-grounds in about the same condition. To recommence medicine.

February 29th.—O.D. V. $= \frac{2}{60}$. Unable to read Sn. 1.25 D., but it was clearest at thirteen c.m. O.S. V. $= \frac{3}{60}$. Sn. 1.25 D. spelt at fifteen c.m. Stop strychnia.

March 25th.—Still complained of fogging of sight when he perspired. Thought that vision was about the same. Said that for about one year, he had been "seeing red stars" before each eye, on any field whatever. Asserted that on the 19th of February, whilst sitting in a chair and not perspiring, he had had an entire red field. This lasted for almost five minutes. He did not have any headache at the time, but he experienced quite a considerable amount of ocular pain. Lately, the centres of his visual fields had been getting filled with "blue stars;" commencing as a large blue spot in the centre of each field. These latter symptoms had been increasing. O.D. V. $= \frac{2}{60}$. Sn. 1.25 D. clearest, not read at twenty-three c.m. O.S. V. $= \frac{6}{120}$. Sn. 1.25 D. read from fourteen to twenty-eight c.m. Ophthalmoscope showed the left nerve to be much the grayer.

March 21st.—O.D. V. $= \frac{2}{60}$. Sn. 1.25 D. clearest, not read at twenty-three c.m. O.S. V. $\frac{1}{12}$. Sn. 1.25 D. read from thirteen to thirty-five c.m. Did not complain so much of the fogging of sight. Appearance of "red stars" still persisted, although they were more marked and mixed with "blue stars" in the right eye.

March 24th.—Renewed strychnia.

(At this time, the patient ran away from his home. It is to be regretted that nothing further could be added to this interesting chain of symptoms.)

CASE II.—Barbara S., aged ten years, first came under my notice on the 23d day of June, 1883. No history of spasms or convulsions during infancy. She said that for twelve to eighteen months, the sight of both eyes had been gradually failing. This had continued until about three months before I saw her, when vision began to improve. At the worst period she was able to see her way about, but could not use her eyes in near work. Was very positive that she could designate and differentiate colors. Was not sick in any way. Very little headache, except when intently working. Able to sew and read for past two weeks only.

In the right eye the ophthalmoscope showed a small disc, vertical-oval in shape and five by six diameters in apparent size. The disc had a "filled-in" appearance, and its substance was so opaque as to prevent the retinal vessels from being followed beneath its surface. A scleral ring was continuous around the disc, beyond which to the temporal side, there was an irregular black crescent; whilst a trace of a choroidal ring was visible to the nasal side. Marked lymph reflexes existed throughout the fundus, which generally followed the larger retinal vessels. Hypermetropia between two and three dioptrics. The nerve of the left eye was more atrophic. In shape and size the same as its fellow. Scleral ring all around. Intense lymph reflexes followed the retinal vessels, as silvery wavy threads, in every direction from the disc.

Attempts were made to take the visual fields, but the child's answers were so contradictory that no accurate results could be obtained.

O.D. V. = $\frac{6}{19}$. Sn. 0.50 D. 11 c.m. — 27 c.m.

O.S. V. = $\frac{6}{12}$. Sn. 0.50 D. 14 c.m. — 23 c.m.

Marked insufficiency of the internal recti muscles. After much trouble, slight red-green blindness was shown by the aid of Holmgren's skeins of worsted.

"Patellar-tendon" reflexes could not be obtained on account of the legs being held so stiff.

January 15th, 1884.—Vision and accommodation about the same.

July 12th.—O.D. V. = $\frac{6}{12}$? Sn. 0.50 D. ten to twenty-eight c.m. O.S. V. = $\frac{6}{9}$. Sn. 0.50 D. thirteen to twenty-eight c.m.

July 14th.—Ophthalmoscope showed that the retinal vessels in the macular regions were distended, and that the smaller twigs in the same regions had the lymph reflexes situated both upon the sides and upon the front, so that when the light from the mirror was made to play over them, the vessels appeared as if beaded.

Case III.—On the 30th day of June, 1883, I first saw Henry S., aged twelve years. His sight began to fail at eight years of age, commencing with the left eye. Was sure that he could read and tell colors at all times during his attack. Complained of frontal headaches, fogging of vision when he perspired, and that his eyes ached when they were exposed to the light. Never had been seriously sick.

O.D. V. = $\frac{6}{24}$. Sn. 0.50 D. 12 c.m. to 22 c.m. O.S. V. = $\frac{6}{19}$. Sn. 0.50 D. 12 c.m. to 22 c.m. Not improved by glasses.

Attempts were made to take the visual fields. Although nothing could be relied upon, it was presumable that there was a central fixation for colors. Green was called white, whilst the other colors were correctly named. This latter observation was confirmed by the wools.

"Patellar-tendon" reflexes were prompt, more especially on the left side. Teeth good. Ophthalmoscope showed that the disc of the right eye was seven by eight diameters in apparent magnitude; long axis at eighty degrees. Disc pallid. Not prominent nor excavated. Irregular partly absorbed conus to the outside, one and a half times the width of the retinal vein. Trace of choroidal ring to the nasal side of the disc. Vessel calibre possibly lessened. No visible lymph reflexes. Hypermetropia between one and two dioptries. The disc of the left eye had the same size and shape as that of its fellow, with its long axis at one hundred and ten degrees, but it was more pallid and had a "filled-in" appearance. Scleral ring in and out, with an irregular broken linear splotching to the out-

side, and a black choroidal ring to the nasal side. Arteries and veins about the same size as in the other eye. Marked lymph reflexes following the course of the retinal vessels. Media clear. Hypermetropia between one and two dioptrics.

Ordered ten grains of iodide of potassium, three times daily.

March 19th, 1884.—Ophthalmoscopic examination. The choroid in the right eye was exceedingly granular in the macular region. Very few lymph reflexes, and these along the main retinal stems. Arteries and veins lessened in calibre. Venous pulsation. Disc had a waxy transparent appearance, with very little capillarity in it, especially to its temporal side. The disc of the left eye had little or no capillarity to its temporal side. Scleral ring more sharply cut to the outside. Arteries and veins diminished in calibre; those going to the temporal region the smallest. Choroid not so granular in the macular region as that in the other eye. Smaller veins very tortuous, especially those in the macular region. Not to take any medicine.

July 12th.—O.D. V. $= \frac{6}{19}$. Sn. 0.50 D. thirteen to twenty-three c.m. O.S. V. $= \frac{6}{19}$. Sn. 0.50 D. thirteen to twenty-three c.m.

CASE IV.—June 30th, 1883.—George S., aged eight years. No history of any sickness. Said that the sight of the right eye had been failing for about one year, accompanied by frontal headaches. O.D. V. $= \frac{6}{48}$. Unable to determine accommodation by the test types. O.S. V. $= \frac{6}{6}$? Sn. 0.50 D. twelve to twenty-three c.m. Glasses did not improve. Irides active. "Patellar-tendon" reflexes normal, although legs were held stiff. The ophthalmoscope showed that the right disc was irregularly round, and about seven diameters in apparent magnitude; red-gray in tint, superficially over-capillary and slightly prominent. Trace of choroidal ring to the nasal side. Black conus out. Marked retinal lymph reflexes, in greatest abundance in the macular region. Hypermetropia equalled four dioptrics. Media clear. The disc of the left eye was swollen and superficially over-capillary, although its edges were everywhere visible; showing a blackish conus out, and a trace of a choroidal ring in. Very few lymph reflexes. Hypermetropia between three and four dioptrics.

Impossible to obtain accurate visual fields on account of the youth of the child; but during the examination central fixation for color was determined.

January 18th, 1884.—Ophthalmoscopic examination of the right eye showed that the disc was still superficially over-capillary, and not prominent. The disc of the left eye appeared much the grayer. The lymph reflexes were far more numerous.

July 12th.—O.D. V. $= \frac{6}{60}$. Accommodation not determined, because his sight was so impaired that he could not read the ordinary test-types. O.S. V. $= \frac{6}{6}$. Sn. 0.50 D. thirteen to twenty c.m. The ophthalmoscope showed that the superior and the inferior edges of the disc were still hazy.

Case V.—July 11th, 1883.—Annie S., aged twenty-one years. This patient had diphtheria at ten years of age. Four years later, she noticed that the sight of both eyes began to gradually fail. Her eyes were examined at the time, and internal medicine was ordered for her. This failure of vision, which was so great that she could not read or sew, or see colors, gradually got better in four years time. Sight had remained stationary for three years. At the time of my examination, she said she could not sew colored things comfortably. Said that her vision became confused, and gave her great annoyance and headache. O.D. V. $= \frac{6}{4}$. Sn. 0.50 D. fifteen c.m. to twenty-four c.m. O.S. V. $= \frac{6}{4}$. Sn. 0.50 D. thirteen c.m. to thirty-two c.m. Visual fields were carefully taken (vide chart).

Ophthalmoscopic examination showed that the disc of the right eye was six by seven diameters in apparent size; its long axis being at one hundred and ten degrees. Sharp cut scleral ring all around, pigmented on its outer border, and passing into a comparatively narrow semi-atrophic conus. Disc excavated and bluish-gray in its temporal half. Very few lymph reflexes. Refraction about emmetropic. The disc of the left eye was the same size; its long axis about eighty degrees. Same character of the scleral ring, which became broader, and was pigmented to its outer side. The disc was much grayer to the temporal side. Arteries and veins smaller than in the other eye. Lymph reflexes more numerous.

The one thirty-second of a grain of sulphate of strychnia ordered three times daily.

July 14th, 1884.—O.D. V. = $\frac{6}{24}$. Sn. 0.50 D. fourteen c.m. to forty c.m. O.S. V. = $\frac{6}{18}$. Sn. 0.50 D. thirteen c.m. to forty c.m. The ophthalmoscope showed that the discs of both eyes were in about the same condition.

CASE VI.—September 24th, 1883.—William S., aged nineteen years. Said that his eyes were perfectly well, until one month before I saw him, when the vision of the right eye began to dim, preceded by frontal headache. For the past three days the left eye had been affected. Was sure that one week previous to this, he was able to read the newspaper with the left eye—though not with the right eye for one month. O.D. V. = $\frac{1}{60}$. O.S. V. = $\frac{2}{60}$ (eccentric). No obtainable accommodation. Central scotomata were found in all of the visual fields. The "patellar-tendon" reflex on the right side was a slow decided single kick, gotten from both the ligament and belly of the muscle. The reflex of the left side, which could be obtained from the ligament only and by a harder tap, gave the same character of kick.

Ophthalmoscopic examination of his right eye showed a well marked neuritis, evidenced by a coarse whitish retinal striation at the disk, about one dioptric in advance of the general level of the fundus. This striation extended about a disc's diameter in all directions, and hid the upper, lower and nasal outlines of the disc. To the temporal side of the disc, a blackish conus twice the width of a retinal vein, could be indistinctly seen. The general tint of the disc was a semi-transparent dull red, except to the outer side, where it was opaque and whitish. The disc of the left eye was swollen, but had more capillarity than its fellow. Almost surrounding the disc, there were long sprays of retained nerve sheaths, which extended to variable distances out into the retina. At the temporal side of the disc, where these retained sheaths ceased to exist, could be seen a large black conus. Retina was semi-transparent and hazy all around the nerve. Macular region was hazy and swollen, with numerous broad lymph reflexes.

Ordered the one-fourth of a grain of mild chloride of mercury, four times a day.

November 21st.—Vision of right eye equalled $\frac{2}{6}$; this gotten by looking to the right of the test letter. Vision of the left eye equalled $\frac{3}{6}$; gotten by looking slightly to the right, and about two feet below the test letter. Did not complain of any headaches. Ophthalmoscopic appearances about the same as at last visit.

December 6th.—Claimed that he saw better on cloudy days; although sure that his sight improved towards the middle of the day. Vision of the right eye was found to be the same as before; whilst that of the left eye, though about the same, was obtained by looking to the left and below.

December 21st.—Color-blindness was carefully tried. It was found that a light pink, an orange, and a lemon were his nearest matches to the pale green skein. About the matches for the red wool he was doubtful; occasionally selecting dark greens and holding them doubtfully by the side of the pattern, and then selecting reds. He rejected the purple skein, saying that there was no such color in the box. Vision remained the same. Had been continuing the use of the calomel ever since his first visit.

January 21st, 1884.—Said that he had stopped the calomel about two weeks previously. Ordered the one thirty-second of a grain of the sulphate of strychnia, three times daily. Vision of the right eye was brought to $\frac{3}{6}$ by making the patient direct his eye four feet to the right of the test letter. Vision of left eye remained the same.

February 18th.—It was found, that when retested for color-blindness, with the use of his right eye, he matched a light yellow with the light green skein; and when the left eye was employed, an olive color was given as the nearest match to the same light green skein. With each eye separately, orange was confounded with red; whilst purple was always rejected upon the ground that there was no similar color.

March 12th.—Ophthalmoscope showed that there was less cloudiness of the supposed retained nerve sheaths.

April 29th.—The vision of the right eye had increased to

$\frac{4}{60}$. This was obtained by the patient directing his eye two feet to the left and below. The vision of the left eye had fallen to $\frac{2}{60}$; obtained in the same situation as in the other eye. The sulphate of strychnia was continued.

May 6th.—He thought that the sight of the right eye was better when he fixed to the left, although $\frac{2}{60}$ could be made out, when the eye was fixed to the right. The same thing happened when the left eye was tried.

July 11th.—Strychnia continued, in conjunction with the one twenty-fourth of a grain of the bichloride of mercury, three times a day.

July 25th. The ophthalmoscope showed that the lymph reflexes were as marked as before. Vision remained the same.

August 8th. Vision about the same as at last visit. The bichloride of mercury was stopped, and the strychnia continued.

CASE VII.—January 20th, 1884. Lena S., aged eighteen years. Said that she never had been sick, nor had any trouble with her eyes. Could sew and read at night as long as she desired. Had some temporal headaches. O.D. V. = $\frac{6}{7}$. Sn. 0.50 D. thirteen to sixty c.m. O.S. V. = $\frac{6}{6}$. Sn. 0.50 D. nine to sixty-three c.m. Ophthalmoscope showed that the disc of the right eye was irregularly round in shape, and seven diameters in apparent size. The disc itself was gray in tint, especially to the outside, where there was but little capillarity. There was a scleral ring all around the disc; it being sharp cut to the outside, with a line of black pigment bordered by some irregular spots. The retinal arteries and veins were about normal in comparative size. Quite a large number of shining white reflexes situated along the main retinal stems. Choroid granular and "black peppery" in appearance. Hypermetropia between one and two dioptrics. The disc of the left eye was about the same size and shape as its fellow, but not so gray in tint. The disc had a "filled-in" appearance, with fair capillarity to its temporal side; in which latter place there was an errant vessel entered. The scleral ring was broad to the outside, but it was not so sharply cut as the one in the other eye. There were several concentric irregular black pigment lines beyond the scleral ring to

the outside. The retinal arteries and veins were normal in their comparative size and calibre. There were fewer lymph reflexes than in the other eye, and they were situated generally along the retinal vessels. Hypermetropia between one and two dioptrics.

No treatment.

July 12th.—Vision remained the same.

July 14th.—The ophthalmoscope showed that the upper and the lower edges of the disc were hidden, and that the retinal striation extended out to the macular region.

Complained of temporal headaches. "Patellar-tendon" reflexes prompt on both sides.

PEDIGREE OF ANDREW S.

- Great-Grandmother, affected.
  - Grandmother, dead, not affected.
    - Grand-uncle, dead at 45 yr., affected at 14 yr.
      - 1. Male, æt. 45 yr., not affected. Had two children, but no knowledge obtainable in reference to their eyes.
      - 2. Male, dead at 22 yr., affected at 18 yr.
    - 1. Uncle, dead at 50 yr., affected at 15 yr. No issue.
    - 2. Aunt, near 50 yr., affected at 35 yr.
      - 1. Cousin, male, dead at 30 yr., affected at 18 yr.
      - 2. Cousin, female, dead at 18 yr., affected at 14 yr.
      - 3. Cousin, fem., æt. 20 yr., not affected.
      - 4. Cousin, male, æt. 18 yr. Not known.
    - 3. Mother, æt. 48 yr., not affected.
      - 1. Sister, æt. 22 yr., affected at 14 yr.
      - 2. Brother, æt. 19 yr., affected at 19 yr.
      - 3. Sister, æt. 18 yr., affected at 18 yr.
      - 4. Patient, male, æt. 14 yr., affected at 14 yr.
      - 5. Brother, æt. 12 yr., affected at 8 yr.
      - 6. Sister, æt. 10 yr., affected at 8½ yr.
      - 7. Brother, æt. 8 yr., affected at 7 yr.
    - 4. Aunt, about 40 yr., not affected. No issue.
    - 5. Uncle, æt. 40 yr., affected at 15 yr.
      - 1. Cousin, male, æt. 6 yr., not affected.
      - 2. Cousin, male, æt. 3 yr., not affected.

The genealogical table shows at a glance the distribution of the malady in the family. It is worthy of remark that neither the great-grandfather and great-grandmother, the grandfather and grandmother, the father and mother of the children, nor any of the parents of collateral branches were in any case blood relations. The eyes of the father and mother were carefully examined, and found to have healthy nerves, with good acuity of vision and perception of color; each eye being, in a moderate degree, hypermetropic. Although in the family examined, the defect was transmitted by the unaffected mother, yet as the table shows, it has been transmitted also in the male line, and in this instance directly by the grand-uncle to his son. Atavism, however (the skipping of a generation and breeding back to the grand-parent), as exemplified by the family under consideration, is of frequent occurrence in this class of affections, as well as in the hereditary transmission of color-blindness. Typical pigmentary degeneration of the retina, and many cases of arrested development of the eye, as in Coloboma of the Iris, also show it.

Of the three generations fully given in the table, embracing twenty-two individuals, of which number there were thirteen males and nine females, seven-elevenths were affected, comprising nine males and five females. The average age at which the disease manifested itself was sixteen years;—fourteen and two-third years being that for the males, and twenty and three-fifth years for the females. The high average in the females of this family is owing to the fact that the malady appeared in one of them at the age of thirty-five years. The disease may also first manifest itself in middle life in the male sex, as evidenced by A. H. A. and C. H. K. (reported in the first paper), where it appeared respectively at the ages of forty-eight and forty-nine years. The above table also shows that it was demonstrable and realized between the ages of seven and nine years, by three members of the family.

Mode of Onset. Of the seven children examined, the loss of sight came on gradually, except in the second child, in whom the ability to read ordinary type was lost in the course of a week after he first noticed a dimming of his sight. In

the aunt who lost sight at the age of thirty five, the attack was also said to be rapid. Although there is no reason to doubt that the ability to use the eye for useful occupations was in these instances rapidly lost; nevertheless the extremely gradual appearance of the disease in the third child (Lena) makes it probable that the first slight dimness and the very gradual formation of a central color scotoma are frequently unobserved by the patient, and that the mischief is suddenly recognized only when some chance vascular storm causes a sudden effusion of lymph into the nerve, and compresses the already diseased macular fibres.

Symptoms.—Frequent frontal headache, with gradual loss of central vision, are the most prominent symptoms. In two cases, the patients volunteered the information that their sight always became much dimmed when they had used enough exertion to cause sweat, and that this was not accompanied by any watering of the eyes. In one case (Andrew) phosphenes appeared as red stars upon a field of any color, followed, later in the disease, by the addition of blue stars in the same field. These subjective colors probably imply corresponding intensities in the pathological changes, due either to increase of vascular pressure or to shrinkage of diseased nerve fibres. The fields of vision for form, yellow, blue, and red, showed that all of the areas were contracted in the order given. Those for color were much more irregular in outline. In these contracted annular areas were places where the centimetre-square of test color passed into a white or gray in the same zone where elsewhere it was readily recognized in its true hue. While this was the usual change in those portions of the retina supplied by sick nerve fibres, other color changes were described by the patients; not only once, but on careful and repeated testing. In some cases (as will be seen by the fields which are herewith reproduced) the red test was seen as blue, and blue as yellow. The central scotoma was usually a more or less irregular vertical oval, extending over a space of five to ten degrees from the fixation point, and in all advanced cases was so dense that a candle flame had to be used for fixation. In the time (seven to thirteen months), during

which the patients were under observation, those portions of the macular region not already occupied by the dense scotomata gradually lost their sensibility to color, although the area of impaired central vision did not alter in size or shape. This impairment of function once started, advanced *pari passu* with the general failure of sight, and is beautifully shown in a sample card prepared for me by Dr. C. A. Oliver, where the colors selected by the patients as matches for the standard skeins are placed in rows. An examination of this card would show a marked difference of color-perception in the two eyes of the same patient. I am sorry that it is impossible to reproduce accurately this sample card, because it would serve better than any verbal description to show the gradual increase of the affection from the first commencement of red-green blindness to so high a degree that colors were classified (as in Andrew's case) by their relative intensities alone.

Ophthalmoscopic Appearances.—The optic nerves presented changes which, for the purposes of description, are best divided into three stages: I. The stage of cloudy and œdematous swelling. II. That of lymph reflexes. III. That of the gradual death of the nerve tissue. In the first of these, the disc is still capillary and hazy, its normal outlines are partly or entirely hidden, while its substance is slightly swollen to usually one half to one dioptric in advance of the macular level. In the second stage, the disc has become slightly grayer, with less haze and swelling. In front of the retinal blood-vessels, and in about the same plane with them, are numerous silvery and yellowish white lines; which in some instances sheathe the retinal vessels, and in others pass off at an angle and ramify through the structure of the retina. These reflexes have usually been most marked in the macular region, and there most developed on the smaller vessels which run in a radiating direction from the main stems towards the fovea: in one instance they crossed in front of the smaller branches so frequently as at first glance to cause the vessel to appear as if beaded. Slight motions of the mirror produced an apparent paralactic movement, which showed

readily whether these silvery lines were in front of the blood-vessels or on the same plane with them. These reflexes are probably partly due to capillary vessels of the retina, which have become visible by the thickening and clouding of their walls, and partly to the enlargement of the lymph channels of the retinal tissue. Certainly, those accompanying the larger vessels must be regarded as belonging to the latter class. It may be presumed that they are essentially the same in nature with the reflexes which, although rarely mentioned, are constantly seen in the over-worked eyes of scrofulous and lymphatic children, by those who use the upright image in their investigations. Schreiber has given[1] a drawing of such appearances, evidently of the same nature, though coarser and more exaggerated than those above described. In the third stage, the reflexes have become less marked and the vessels diminished in calibre (often spindling as they enter the disc); whilst the nerve tissue itself, opaque gray in color, and looking as if "filled-in," finally assumes a greenish tint, and all of the marks of pronounced atrophy. Even in the most advanced cases, the central vessels were never greatly shrivelled, and remained of moderate calibre.

Course of the Disease.—Two of the patients improved. One of them (Annie) before she came under observation. Her attack came on at fourteen years of age, and for two years, she says, she was unable to sew, read, or distinguish colors. When first seen by me, at the age of twenty-one, she had a vision of $\frac{6}{24}$, and read Sn. 0.50 D. from thirteen to thirty-two centimetres. Her improved vision, although very satisfactory to herself, was by no means a restoration of anything like perfect sight; for besides the diminished acuity just mentioned, she still had a contracted field for form and color, and a central color scotoma in each eye. With the left eye, she was able to distinguish red in only a very small portion of the field. Indeed, after such severe lesion of the macular fibres, a *restitutio ad integrum* could not have been looked for. Andrew, the fourth child of the family under immediate observation, also ex

[1] "Veränderungen des Augenhintergrundes bei internen Erkrankungen." Separat-Abdruck aus dem "Deutsches Arch. f. klin. Med." 1878. Bd. xxi., S. 65 (Taf. iv.).

hibited improvement. In three months time, the vision in the left eye rose from $\frac{1}{60}$ to $\frac{6}{36}$; thus enabling him again to read coarse print — although the central scotoma was but slightly diminished in density, and the color-blindness persisted. Unfortunately, no remedy has as yet been found which exerts a marked influence in shortening the course of the disease, or in mitigating the severity of its manifestations. The two cases, where there was decided improvement, seem rather to have been due to some temporary arrest or permanent limitation in the progress of the affection, than to any treatment pursued. In my last paper, I gave the methods of treatment advocated by Mooren and Leber, as well as those pursued by myself. I still think, as previously stated, that here as in other atrophies, strychnia is a valuable remedy, not by any specific action on the nervous system, but by its property of augmenting the arterial pressure, and thus forcing more blood into the starved tissues. Of course, at such times when the patients complain of fogging of the sight and of phosphenes, strychnia should be desisted from, and replaced by the use of purgatives, associated with such resolvents as potassium iodide and the mercurials. Our object in this change of treatment being to diminish the intravascular pressure and to promote osmosis from the tissues, by emptying the turgid and overfilled vessels supplying the diseased nerve-fibres.

DISCUSSION.

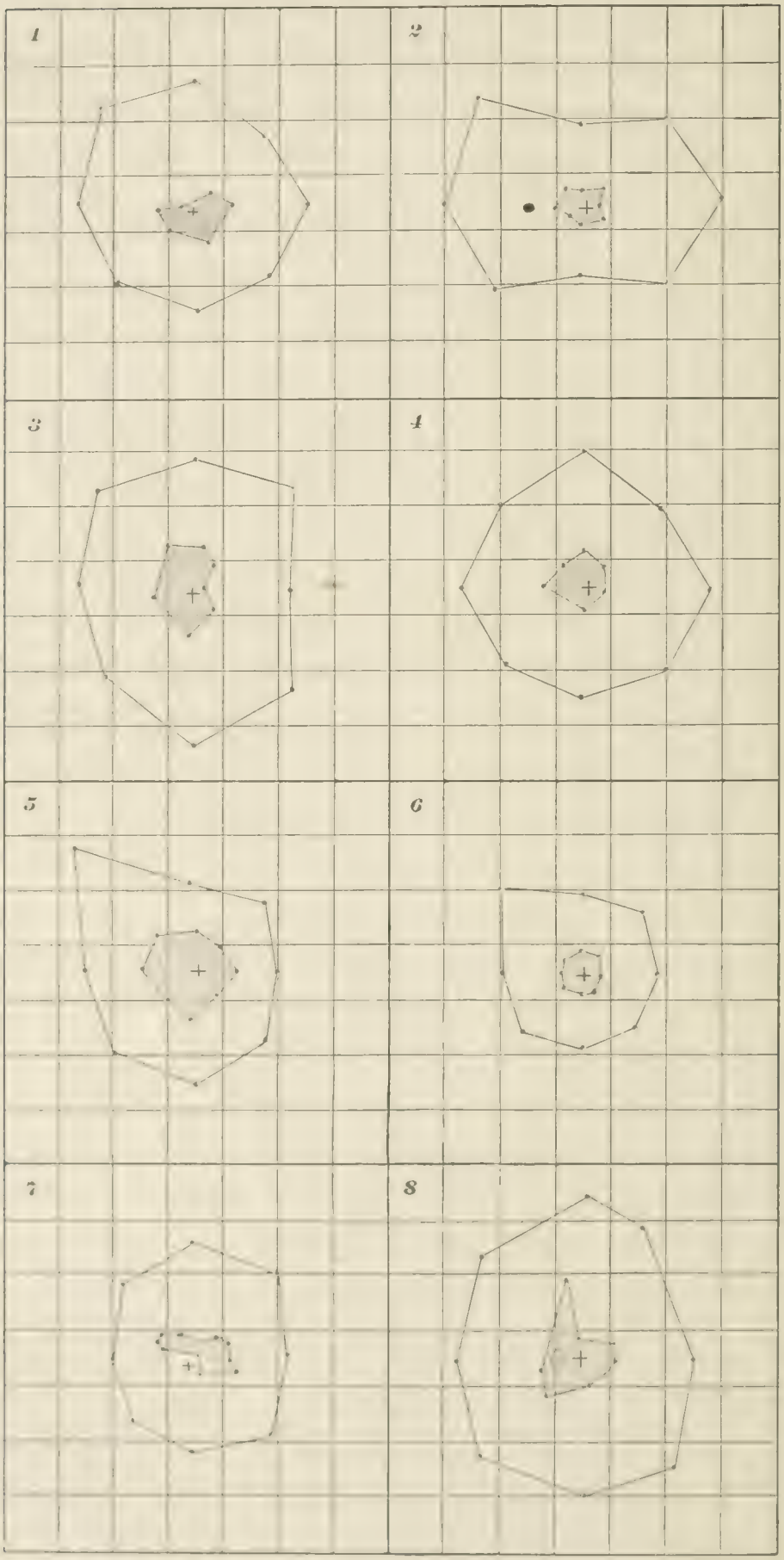
DR. HOWE.—I simply wish to ask if the condition showed itself at an earlier age in the younger generations. This, as is well known, happens in hereditary glaucoma. I should like to know if that were the case in atrophy.

DR. NORRIS.—The same tendency manifested itself in these cases—less in the different generations than in the different members of the same generation—the younger children being affected at an earlier age. One of the earliest cases appeared at the age of seven. The latest period for its development in this family was at thirty-five years of age.

DR. KIPP.—I did not catch whether these cases had simply color-blindness. Cases have been reported in which there was atrophy, in others simply color-blindness.

DR. NORRIS.—In all these cases there have been scotomata. None of them have had simply color-blindness without atrophy.

PLATE I.



EXPLANATION OF PLATE I

There are eight fields for white on this plate. Each field has been reduced to 1-12th of its original size. They were all obtained by the carrying inwards on a large ruled black-board, of a centimetre square of unglazed white paper, on a dead black card; the patient being placed at about twenty-five centimetres distance from the fixation point, which in nearly every instance consisted of a small lighted taper. (This point has been designated by a black cross.) The outer ruled lines represent the furthermost boundaries of the white field, whilst the inner lines designate the limits of the central scotomata. These central areas have been crosshatched in their rulings when the scotomata were so dense as to necessitate the employment of a light for fixing, whilst in the cases where the white painted cross on the black-board could be dimly seen, the areas are merely lined in a horizontal direction.

Figure 1 represents the field for white of the right eye of Andrew.
Figure 2 " " " " " " " left " " "
Figure 3 " " " " " " " right " " Annie.
Figure 4 " " " " " " " left " " "
Figure 5 " " " " " " " right " " Lena.
Figure 6 " " " " " " " left " " "
Figure 7 " " " " " " " right " " William.
Figure 8 " " " " " " " left " " "

It will be noticed that the scotoma in the field numbered seven is eccentric, and does not involve the fixation point.

EXPLANATION OF PLATE II.

This series represents the yellow fields of the same patients. They are placed in the same order as on the first plate, and were taken in a similar manner, with the exception that here a centimetre square of yellow was used in place of the white square previously employed. The outer ruled lines, as in figures nine, ten, and sixteen, show the positions in which the yellow square was designated as white. The outer dotted lines give the outer boundaries of the yellow fields, seen as yellow. The inner dotted lines, enclosing areas of crosshatching and horizontal rulings, represent the kinds and areas of central scotomata in each case. In figure fifteen, which belongs to the same eye as gave the field numbered seven, the partial scotoma is not central.

PLATE II.

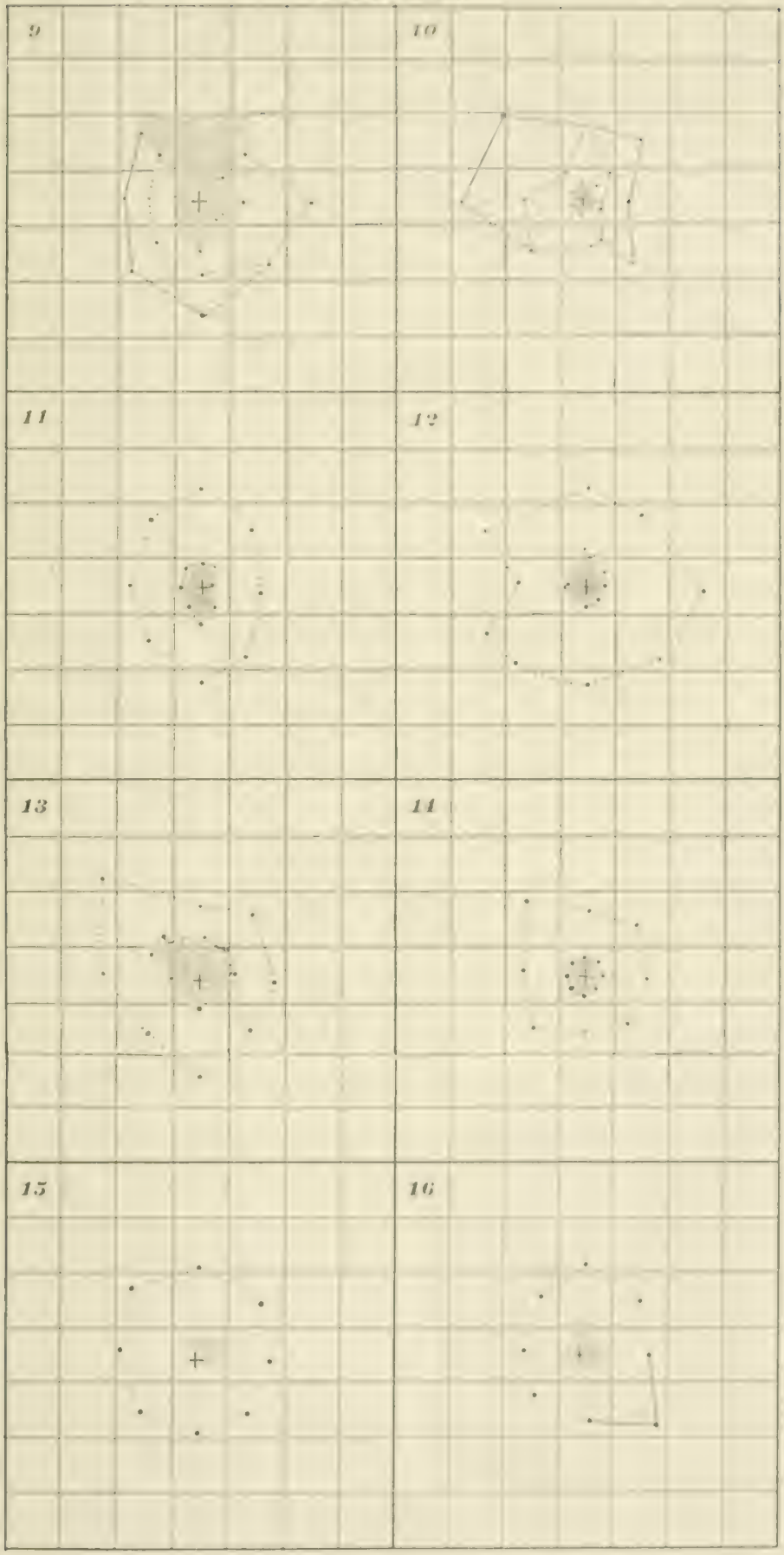
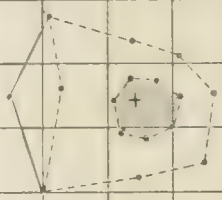


PLATE III.

17

18



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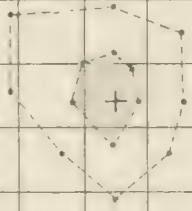

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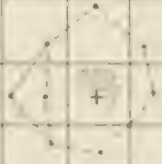

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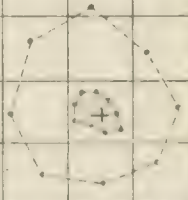


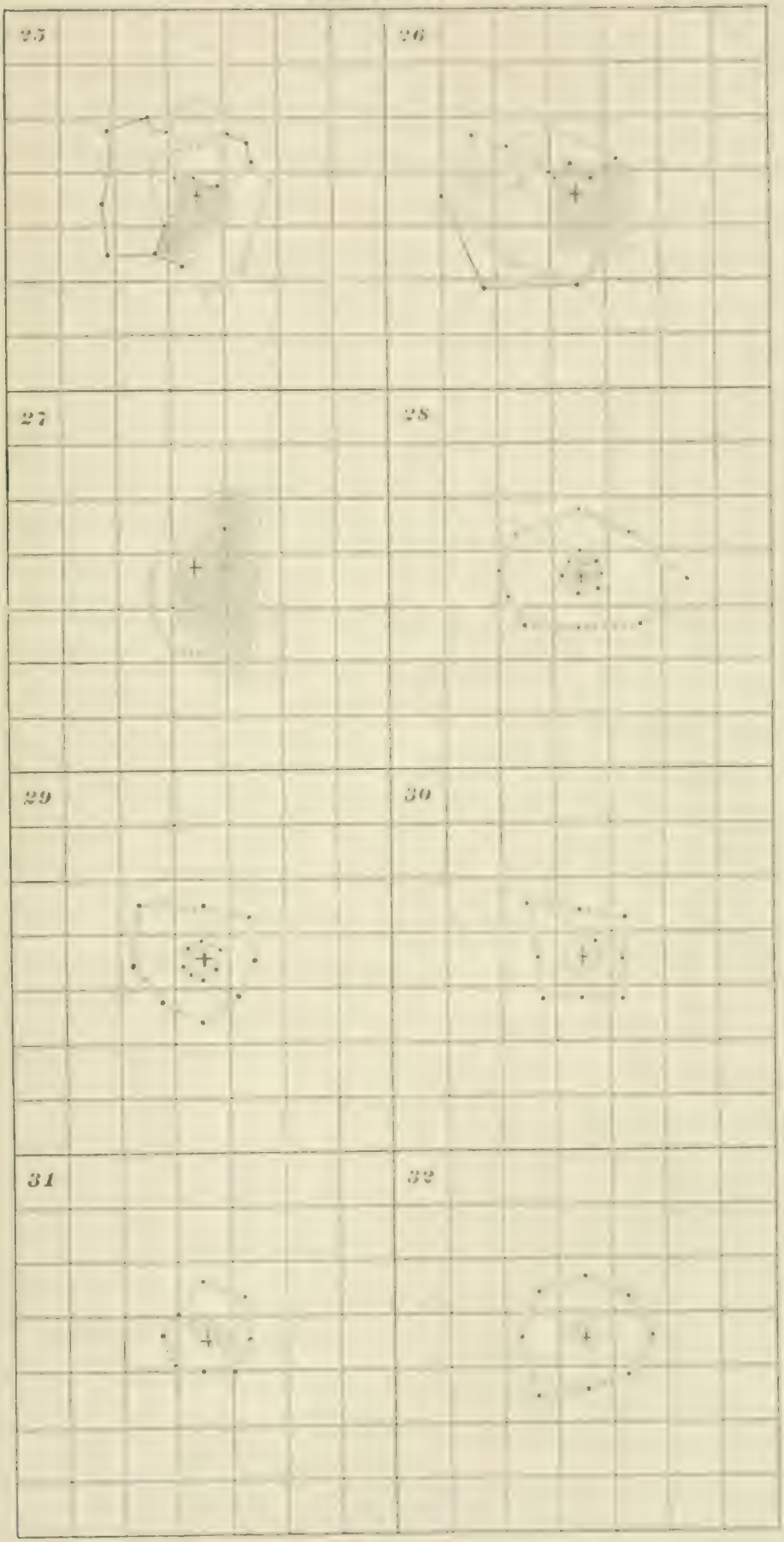
EXPLANATION OF PLATE III.

This gives the series of blue fields. The ruled lines represent the position in which the blue square was said to appear as white; the dotted lines where it assumed a yellow tint; whilst the stroked lines designate the outer boundaries of the blue field, seen as blue. The inner stroked lines show the areas of the central scotomata, which in those fields that are ruled horizontally, were not sufficient to produce an entire loss of the blue color of the square. In figure twenty-three, the area of the blue dimming is seen to be situated eccentrically.

EXPLANATION OF PLATE IV.

This is the series of red fields for the same cases. The ruled lines bound the areas in which the red square is called white; the dotted lines those in which it is called yellow; whilst the outer lines composed of small circles, give the boundaries of the red fields, seen as red. The central scotomata are designated as before.

PLATE IV.



JEQUIRITY OPHTHALMIA.

By JOSEPH A. ANDREWS, M.D.,
NEW YORK.

HAVING quite recently[1] considered, at some length, the subject of Jequirity Ophthalmia, I desire here to limit my remarks to a brief review of certain papers that have appeared on the subject in question since my own communication alluded to above was published.

First, is jequirity directly responsible for the disastrous results which have been placed on record as having followed its use?

Has it a constant and regular action, and are there any dangers to be apprehended from its employment, even according to the directions which I have indicated in my paper (l. c. p. 251)?

In order to answer the first question, it will be necessary to examine the evidence which has been adduced to show that jequirity is to blame for the mischief to the eye which has resulted during its use.

Jacobson[2] records a case in which jequirity produced purulent infiltration of the cornea, perforation of the latter, and exposure of the entire iris. This would certainly seem to be a grave reproach to the use of the remedy in question. In this particular case, the ophthalmia produced was certainly not true jequirity ophthalmia, and yet this circumstance would not be a sufficient defence of the remedy; but I am convinced that the real source of mischief is to be sought in the strength of the infusion and the manner in which it was employed, Jacobson having, namely, *instilled* the infusion (5 %) into the

[1] Trachoma and the Literature of Jequirity Ophthalmia. Archives of Medicine, vol. xi., No. 3, pp. 221–261. June, 1884.

[2] Berliner klinische Wochenschrift, No. 15, April 28, 1884, p. 258.

conjunctival sac, and kept up the action of the drug with compresses wet with the infusion. This was following De Wecker's first instructions regarding the use of jequirity, to the letter, and that De Wecker obtained uniformly favorable results before he had modified his manner of applying the drug, is certainly very remarkable and providential. But in Dr. Knapp's two cases,[1] although true jequirity ophthalmia was not produced, a violent pyorrhœa having followed the use of the infusion, and affected the other, not inoculated eye, nevertheless this case is a most instructive one. Dr. Knapp treated the two cases in question according to De Wecker's last directions, making a single brushing of a fresh 3% solution, macerated for three hours, over the entire upper lid; and yet this single application was followed by violent reaction and perforation of the cornea. If it be possible, with jequirity, to produce a purulent ophthalmia, then we cannot defend the remedy in a given case in which it has produced mischief by the substitution of a purulent for a genuine jequirity ophthalmia. Nevertheless, I confidently believe that the dangers to be apprehended from the drug may, in a very marked degree, be avoided by observing the strictest caution in its use.

The facts which should be seriously borne in mind are, that all eyes are not affected in the same degree by the remedy; a 3% infusion in one instance being followed by violent reaction, while in others a stronger infusion may give rise only to slight reaction. Therefore, I believe that the safest plan to observe is to begin with a weak solution, say 2%, even where there is pannus, and 1% when the cornea is not involved, and keep in mind the fact that there is a period of incubation which may exceed twenty-four hours. The berries should be husked, crushed, and macerated for about six hours in cold distilled water, then filtered; and after a single thorough brushing of the palpebral conjunctiva with a piece of cotton wrapped about the end of a match, thirty hours are allowed to elapse before renewing the brushing; then, according to the susceptibility of the patient to the action of the remedy, we may repeat

[1] Archives of Ophthalmology, Vol. xiii., No. 1.

one, two, or three times daily, always proceeding with caution and *never keep up the action of the drug with compresses wet in the infusion.* By following these directions I have never yet seen an untoward result, and I have used the remedy in one hundred and forty cases of disease of the cornea and conjunctiva.

Preëxisting purulence is a positive contraindication to the use of jequirity. Papillary hypertrophy of the conjunctiva is not favorably influenced by the remedy. Hippel says, the more hyperæmic the conjunctiva is, the more intense will be the reaction. De Wecker says this is an error; but from my own observations I feel disposed to believe that Hippel's statement is, in a measure, correct. However, this much is true: the nearer the conjunctiva approaches a normal physiological condition, the more certain and intense will be the impression produced by the infusion. The most violent reaction I have seen follow the use of an infusion of jequirity, occurred in a case of sclerosis of the cornea, in which the conjunctiva for all practical purposes was normal. But the patient in this instance took upon herself the responsibility of departing from my instructions, and instead of a single application and awaiting the lapse of the number of hours indicated, she *poured* the infusion (3%, cold, macerated for six hours) into the eye four times during the day. The result was a most intense chemosis and swelling of the lids and corresponding side of the face, and nasal mucous membrane; and in the region of the frontal sinus the pain was so violent that the patient declared that she did not sleep for three nights; and I am convinced that her suffering must have been very acute. With violent inflammatory reaction, there was extensive formation of a croupo-diphtheroid membrane, and a resulting symblepharon, and what is most instructive for us to remember is the circumstance that it was a case of genuine jequirity ophthalmia, no purulence having occurred at any time in the course of the inflammation. And yet the vision was improved from an ability to perceive light, to counting figures at fifteen feet.

De Wecker says[1], "without any doubt, the cornea is not

[1] Graefe's Archiv. für Oph., Bd. xxx., Abth. i. p. 267.

exposed to any danger" in jequirity ophthalmia. But the first case in which I employed the remedy taught me that this was a most pernicious error, and that the cornea is endangered.

However, if we compare the number of authors who have declared themselves for or against the jequirity treatment, we find that the former are conspicuously predominant, and it would seem that those authors who do not favor the remedy, such as Vossius, Galezowski, and Nicolini, might change their views if their experience were extended to a larger number of selected cases.

Scrofulous pannus, sclerosis of the cornea are favorably influenced by jequirity, and I have had very gratifying results in this class of cases in improving the vision, but I have never used the remedy, as De Wecker has, in torpid ulcers of the cornea; firstly, because I could not satisfy myself that the cornea was not placed in still greater danger by its use; and secondly, I felt that I could rely on safer and really satisfactory means. However, of course, mere conjecture should not be permitted to weigh against the results of experience, and De Wecker's experience seems to speak in favor of the remedy in this class of cases.

DISCUSSION.

DR. NORRIS.—Could you get croupous inflammation with the weak solutions?

DR. ANDREWS.—With a two per cent. solution, yes. Using it as recommended by Jacobson, you cannot tell how much mischief you are going to do. I have treated many of these cases as out-patients. I make a single application and have the patient return on the following day, when I make another application if it is necessary. In one case, I gave the patient a two per cent. solution and told her to make one application. Instead of that, she made four applications, pouring the infusion into the eye. Considerable ulceration of the conjunctiva was produced, and the reaction was so intense that I thought that she was going to lose the eye, but fortunately the case did well and the vision was improved. It was a case of opacity of the cornea resulting from purulent conjunctivitis when a child. She was at this time thirty-two years of age.

I should like to ask whether any of the members have examined trachomatous tissue to ascertain whether or not there are any micro-organisms in that tissue: I have examined 3,000 sections without finding any.

DR. KNAPP.—What was the other bad case?

DR. ANDREWS.—The other case was one of trachoma, the cornea not being involved. There was a good deal of ulceration of the cornea as a result of the application. In the one eye, the ulcers healed, leaving a perfect cornea. In the other, there were several places where the ulceration had left depressions in the cornea. This was a result of the old plan of using the drug. The results of observers in France have been very unfavorable, and we should not be surprised at that, when we consider how the remedy was used. I think that it is very gratifying to take a patient who comes almost blind, with simply light perception, and so improve vision that he is able to count fingers at eighteen or twenty feet.

DR. THEOBALD.—Do you stop after one application?

DR. ANDREWS.—Not with the weak solution, and I never begin with a strong solution, because it is impossible to tell how susceptible the patient may be.

DR. THEOBALD.—It seems to me that that is the point. There is an immense difference in the susceptibility of patients to the action of this drug. In some instances it has been applied ten or fifteen times without exciting sufficient inflammation. In other cases, a single application of a three per cent. solution has caused severe inflammation. Dr. Andrews's suggestion that we begin with a weak solution, is, I think, a wise one. After waiting twenty-four hours we have learned something as to the susceptibility of the patient, and can then go on with the treatment. I have had a limited experience with it; but in one case the result was very satisfactory. It was an old case of granular lids with well marked pannus. I had treated it for a long time without any decided change for the better. I followed the plan adopted in Boston of using a two per cent. solution three times a day until ten applications have been made. There was a great deal of reaction after the second application. During the treatment there was some corneal ulceration, but this disappeared and the lids became smooth and the cornea much clearer than before the use of the jequirity. There has been no relapse. I think there is no question but that we have a most valuable remedy in jequirity.

DR. NORRIS.—I had a case in which the conjunctiva seemed to lose its sensibility to jequirity after continued applications. The patient was a woman who had had granular ophthalmia

and well developed pannus for years. When admitted, she could scarcely see more than the motions of the hand. Now she can see the large letters of the test type at a short distance. When the inflammation which followed the application of jequirity had subsided, the conjunctiva was treated with boroglyceride. Jequirity was again applied, and later in the treatment it was used a third time. After each application its action was less intense, and it seemed more difficult to excite inflammation.

DR. THEOBALD.—That observation has been made in a number of cases.

DR. HOWE.—I mentioned the same fact a year or two ago in a Journal published in Buffalo. The same thing occurs in rabbits. After the fourth or fifth day the inflammation begins to subside, and although the application is continued, it seems to have no effect.

There is one other point and that is in regard to the variety of the bean. In my first experiments, I obtained the beans from New York and had poor results. I afterwards obtained the beans from the party who supplies the Massachusetts Eye and Ear Infirmary. The difference could at once be seen. With these a weaker solution was sufficient.

DR. SEELY.—The more experience I have with jequirity, the less stress do I lay on the strength of the solution. There is a vast difference in the effect on different individuals. This is dependent either on the beans or the mode of application. More stress should be laid on the manner of application. The infusion which I use is practically a saturated one, the water contains all the jequirity it will hold in suspension. I make the infusion and then determine how much effect I want. The infusion is then applied according to the action desired on the upper, or lower, or both lids. It certainly acts admirably in a vast number of cases, even in simple corneal opacities. In one case of scleritis, it was the only thing which seemed to have any influence on the condition. There is, I think, one process which has been overlooked in the treatment of corneal opacities. I am satisfied that it is of immense service. That is, to tattoo the opacities of the cornea, omitting the staining material. (In reply to a question, Dr. Seely stated that a croupous membrane had always formed.)

DR. ANDREWS.—In regard to the difference in strength of the solutions, and the different results obtained by observers. It seems to me that the greatest stress should be laid on having the infusion fresh. When it is old, you do not know how it will act. In regard to the diphtheritic process. In the case

in which the patient took the treatment into her own hands, there was considerable ulceration of the cornea and lids. There was no croupous inflammation in that case. There might be a similar risk in the Eustachian tube when the remedy is used, as indicated by Dr. Seely, for middle ear disease.

DR. SCHELL.—As regards the use of a perfectly fresh infusion, I find that an old solution is just as good if it has been preserved with boracic acid. This was suggested by Mr. Sayre of Philadelphia. Four grains of boracic acid are added to each ounce of the infusion. Such a solution lasts for three months at least.

DR. NORRIS.—I can confirm the observation of Dr. Schell. I have a number of times used such a solution several weeks old, and have had croupous ophthalmia follow.

DR. WADSWORTH.—I have tried an infusion made with a two per cent. solution of carbolic acid. This was active after several weeks. No bacilli were found in that solution. The examination was made by Dr. Ernst, who has been working on bacilli for the last year or two.

DR. ANDREWS.—It seems to me that the bacilli are not the active agency, but that they, on the contrary, spoil the infusion.

DR. THEOBALD.—In regard to the uncertainty of results depending on differences in the bean, I may mention that I was lately shown a bean brought from some watering place which closely resembled the jequirity bean, but was said not to be the genuine bean. It may be that sometimes we get this spurious bean.

DR. PROUT.—It so happens that since the introduction of the jequirity bean I have not had occasion to treat a case of pannus. I wish however to refer to a paper which I published in the Transactions of this Society (Seventh annual meeting, 1870, p. 114), where I reported two cases in which I had used quinine locally in obstinate pannus. One patient at his first visit had to be led to the hospital; when he went out, three and a half months later, he could read fine print. The other case was similar. I am therefore not prepared to admit that jequirity is the only remedy that will cause improvement in these cases, and, from the bad results of its use that have been reported, have not yet developed an enthusiasm in its favor.

A NEW PERIMETER.

BY EZRA DYER, M.D.,
NEWPORT, R. I.

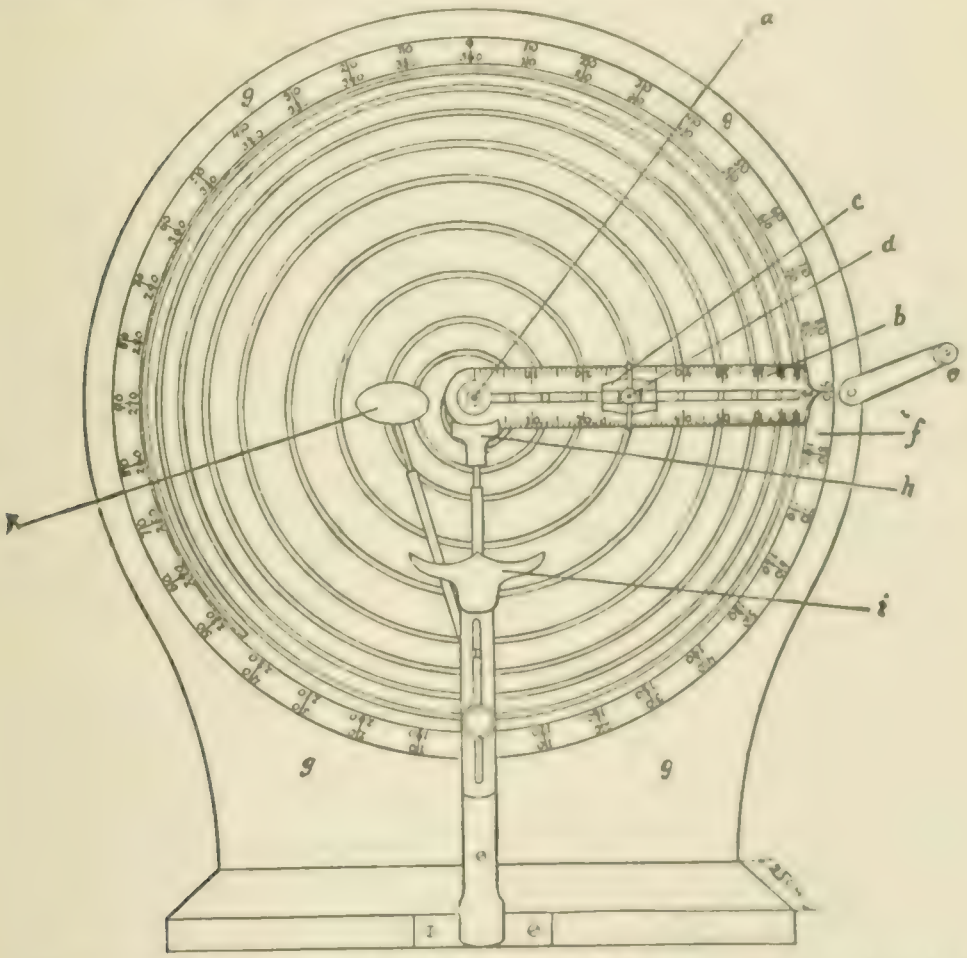
THIS perimeter is a combination of the bow perimeter of Aubert-Förster and the hemisphere of Sherk. The method of testing the field of vision, however, differs entirely from any heretofore in use.

There are some objections to Förster's perimeter. The examination requires so much time, that it is rarely made unless a limitation of the field is known, or strongly suspected. When it is made, if the meridian is tested for every 15 degrees, the arm must be moved twenty-four times, and even then the intervening portions of the fundus are missed, especially at the periphery. The length of time this occupies is fatiguing to the patient, and it is almost impossible to complete the examination without a movement of the head. The examination on the blackboard is useless for the extreme portions of the field, as the tangent of $90° = 0$.

The advantages claimed for this perimeter are, first, The entire field of vision is traversed by the eccentric object from the periphery to the center, and by reversing the motion, from center to periphery, in two minutes, without haste. This brings an exhaustive examination of the field of vision for the detection or exclusion of a limitation or scotoma within the available time of any one. Second, When a limitation of the field is detected it can be very rapidly mapped out, saving time to the examiner, fatigue to the patient, and ensuring greater accuracy, as in the short time required there is little danger of a movement of the head. Third, Both objectives can be made small electric lights of from one to seven candle power, at will. With these the sensibility of the retina can be tested quantitively.

The following is a description of the instrument. A spiral of strong brass wire, blackened, starting from the point *a*,—of central fixation,—forms a well supported concave hemisphere.

The radius is 25 c.m. Inside this wire hemisphere is a curved arm *b*, of hard rubber, which is revolved by a crank *c*, fixed to the background *g*. It can be worked by the patient, or examiner, who may stand either in front of or behind the instrument. On the arm is a traveller *c*, which follows the wire, sliding in a slot running the length of the arm. On the traveller is the eccentric object *d*. A double chin rest *i*, with support for the infraorbital ridge *h*, insures the fixation of eye in the centre of the hemisphere. A cap *k*, of hard rubber, excludes the eye not under observation. This can be moved from right to left, or thrown down entirely, at will.



The method of examination is as follows. The patient is seated before the instrument, with his chin in the rest and his attention fixed on the central object. The eccentric object is started from the periphery by the crank, and following the wire, moves in ever decreasing circles until it reaches the

center. The movement can then be reversed and the object carried to the periphery. If the object is perceived throughout its entire course, the existence of an insensible tract may be excluded. The examination occupies two minutes. Should the patient suddenly lose the object, a reverse turn of the crank will bring it to the same meridian, but one wire further from the center, where it will be seen. Then the edge of the scotoma lies between the two wires. The object slides in a groove on the traveller, so that it will meet the half distance between any two wires. In this way, any and every point in the fundus can be tested. The meridian is indicated by the arm, on the circle graduated to 360°, which forms the outer edge of the perimeter. This, as well as the arm, is graduated on the face and back, the arm to 90°. Both objectives are held by a small bulb-pointed pin, which is clasped by springs. They are made of card board, and can be of any size or color desired. They can also be changed very readily. A movement of the arm forwards and backwards, at any questionable spot, is sufficient to attract the patient's attention, but to increase this, I have devised a delicate spiral spring, with a pin at each end. The object is put on one end, while the other, bulb pointed, is inserted in the slide. This keeps the object in constant vibration, even after the movement of the arm is arrested. A card 5 c.m. square, with parallel lines fixed to the traveller, may be used to show the meridian in astigmatism.

This perimeter gives us the means of making a quantitative test of the sensitiveness of the retina. I believe that in many cases where the retina is insensitive to our common test of a small white object, it might be excited by a bright light. The candle power is a definite quantity, which can be recorded. The brass spiral wire serves as one conductor, and a strip on the arm as the other. The lamp is 2 c.m. in diameter, with a ground glass dial covering the loop or bridge of No. 42 platinum wire. The diameter of the dial is 1.5 c.m., that of the loop 1 c.m. A Grenet zinc and carbon battery of 3 small cells (not shown in the drawing) is easily accommodated on the base of the instrument, under the spiral. This will bring the

bridge to a white heat equal to 7 candle power. This is with full immersion of the plates in a fresh solution, standard, of bichromate of potash. A slight immersion will give a cherry red, or one candle power. The intensity of the light is proportionate to the degree of immersion, and the candle power is read off on a scale attached to the battery.

The instrument, with or without the electric attachment, can be had from F. H. Wilks, Newport, R. I.[1]

A CASE OF EMBOLISM OF THE RETINAL ARTERY.

BY H. S. SCHELL, M.D.,

PHILADELPHIA PA.

ALTHOUGH cases of embolism of the retinal artery are not infrequent, the following has some features of peculiar interest which, perhaps, make it worthy of record.

Mary MacMahon, seventy-one years of age, applied at Wills' Hospital for treatment on the 2d day of January, 1884.

Whilst walking about the house two days before, she experienced a flashing of different colors before the left eye, followed immediately by the sudden loss of vision of that organ. She had previously noticed an occasional flashing of colors, of indefinite duration, before the right eye; this was especially remarked when occurring in the dark.

The pupil of the left eye was found upon examination to be slightly dilated. Tension + 1? There was some drooping of the upper lid.

An examination of the heart resulted in the diagnosis of an insufficiency of the mitral valve, accompanied by hypertrophy of the left ventricle. The ophthalmoscope disclosed a pallid and swollen disc and œdema of the central portion of the retina, with, however, no red spot at the macula. The vessels were attenuated; the veins very much smaller than the arteries, the latter not much below their normal diameter. There

[1] It has been suggested that a battery of 25 cells, or two small, I think, however, that it is sufficient. The maker will furnish the instrument with any cells desired.

was a very slight difference in color between the two sets of vessels.

In the inferior branch of the artery, just before it passed over the edge of the disc, there was a space, about one fourth of the disc's diameter in length, which was apparently empty of blood. This space included the entire calibre of the vessel, was pale in color and motionless. Pressure upon the ball from before backward in the manner recommended by Mauthner,[1] so as to increase the ocular tension, emptied the veins completely, but had no effect upon the arteries. The veins refilled instantly when the pressure was removed. After massage had been practised in this way for some minutes, a regular current of blood began to flow through the vessels. This movement was made visible by the fact that the blood stream was broken into numerous very short cylinders, separated by about their own lengths, and following in regular procession, without rhythm, and with about the apparent rapidity of the blood corpuscles in the capillaries of a frog's foot, under the microscope.

These little cylinders passed from the disc some distance along the arteries before they were lost sight of in the œdematous retina, then formed again at the distal extremities of the veins and flowed back to the disc. This appearance is indicated in the accompanying sketch. Fig. 1.

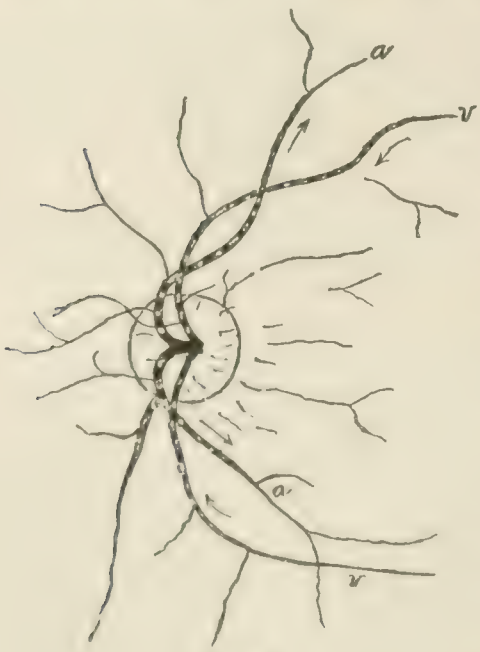


Fig. 1.

The movement, in the direction shown by the arrows, could be traced in the superior and inferior temporal branches of the vessels, and in the inferior nasal branch of the artery, but was observable over a much greater length of channel in the upper than in the lower branches. The other branches

[1] Sitzungsber. der Gesellsch. d. Aerzte in Wien, vom 23 Feb., 1883.

of the retinal vessels were quite thin, almost thread like. The patient asserts that before the attack the vision of the left eye was much more acute than that of the right, which is now $\frac{2}{20}$. The right eye presents a somewhat ill defined and muddy disc, such as is not infrequent in senile patients, and the visual field of the organ is somewhat contracted.

January 4.—There was increased œdema in the lower half of the retina. The movement of the blood in the vessels continues precisely as at the last examination and the appearances are the same, except that the lower branches are more obscured by œdema than before. Potassium Iodide, 5 grs. three times a day, was prescribed, in addition to the massage.

January 7.—When the eye was first examined to-day, the arteries were found to be very small and pale, with the empty spot in the inferior branch at the same position on the disc as noticed at the first examination. See Fig. 2. x.

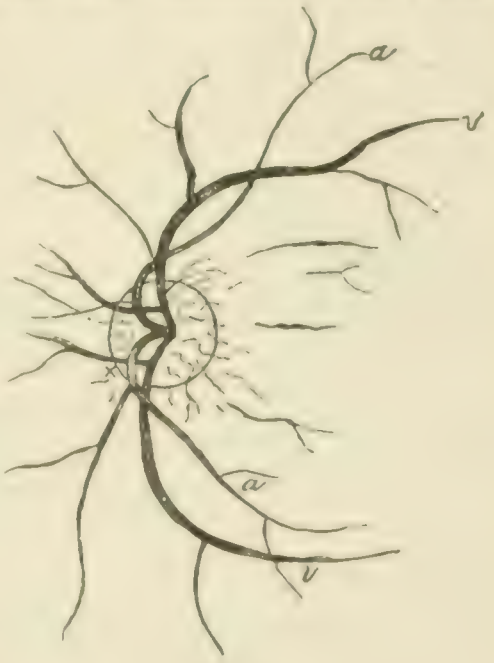


Fig. 2.

The veins were very large, black and distended. No movement was visible. The patient at this time was very much oppressed in consequence of the heat of the ophthalmoscopic room, for she was wrapped in the furs and heavy outer clothing which she had worn while coming to the hospital, as a protection against the severe weather.

When I noticed this, I requested her to remove her furs and wraps, applied massage, and in five minutes the veins had shrunk to the calibre noticed on the first day, and the interrupted current flowed again as before, as indicated in Fig. 1.

The movement in the lower branch of the vein, however, remained much more sluggish than that in the upper.

After this date, there was no change in the ophthalmoscopic appearances until January 21st, at which time no movement

in the vessels could be detected, and the arteries and veins had both become very thin. Even at this time, under the application of massage, the movement re-commenced, but could scarcely be discerned anywhere, except in the superior temporal branch of the vein. Ammonii Murias, grs. ij. three times a day, was substituted for the Potassic Iodide.

February 13.—The œdema of the disc and retina had almost entirely disappeared. The macula lutea could be distinctly seen, and all the details of the fundus clearly made out. The interrupted blood-current could still be faintly discerned in the much contracted superior temporal branch of the vein, but no where else. There was now light perception in this eye.

February 27.—The disc had become white; the arteries thread-like, except that three small spindle-shaped dilatations, on as many branches, could be seen, at the points marked d, d, d, in Fig. 3.

Fig. 3.

There was no longer any movement visible, nor could any be elicited by interrupted pressure. The veins were thread-like on, and a little beyond the margin of the disc, but became thicker and fuller of blood and darker at their distal extremities.

No further change took place in the ophthalmoscopic appearances during the month of March, after which the patient was not seen, she having removed to Texas.

It is, perhaps, an open question whether this case was one of embolism or of thrombosis; but I have adopted the former title, because, notwithstanding the condition of the optic nerve in the right eye, there was no sclerosis to be detected in any artery that could be felt in any part of the body; because there had been no antecedent attacks of dimness of vision, and because there was evident disease in the interior of the heart.

It seems to me probable that, in this case, the embolus was too large to be admitted entirely into the arteria centralis retinæ, and was yet of sufficient irregularity of shape to allow a certain amount of blood to pass it and to enter the intra-ocular circulation. The facility with which the veins were emptied and the absence of any permanent improvement in the condition of the artery, through the application of massage, showed that the embolus could not be dislodged from its position. The slight gain in vision, from total blindness to light perception, possibly resulted from the emergence of an island of sound retinal tissue after the subsidence of the retinal œdema; but I was never able to detect its existence. Mauthner's recommendation that, as a last resort, sclerotomy should be performed, in the hope of driving the embolus into one of the arterial branches, and so liberating the others, seemed to offer so little hope in this case, that the patient was not subjected to the operation.

Hirschberg reports two cases, Centralblatt f. p. Augenheilkunde, January and March, 1884, and alludes to four others, in which the moving blood-current could be seen in the retinal vessels, namely: 1.—E. von Jäger, Staar und Staaroperation, 1854, S. 105. 2.—A. von Græfe, Arch., v., 1, 136. 3.—Meyhöfer, Inaug. Diss. von 17, May, 1873. 4.—A. v. Hippel, Ophth. Univ. Klinik zu Giessen, 1879 to 1881, S. 25. Liebreich also claims to have seen the blood-movement in a case of detached retina. A. f. O., v., 2, 261.

Jäger, Ergebnisse der Untersuchung mit dem Augenspiegel, 1876, p. 100, says he has seen several such cases.

DISCUSSION.

Dr. Norris.—I may say that I had the opportunity of studying this case with Dr. Schell, and I can substantiate his statements in regard to the interrupted circulation in the vessels. This occurrence has been recorded by Jaeger and several other observers, but this was the first time that I had the opportunity of seeing it myself.

A CASE ILLUSTRATING THE NATURAL HISTORY OF CATARACT.

BY A. MATHEWSON, M.D.,
BROOKLYN, N. Y.

DR. T. L. S., aged eighty-four, became blind from cataract more than twenty years ago. The right eye was operated on by the late Dr. F. I. Bumstead, by the flap method, in 1863, with good result, V. being $\frac{20}{30}$, and he having full use of the eye ever since, without trouble of any kind. The left eye, in which the cataract was untouched, was subject at intervals to attacks of iritis, which subsided under use of atropine, leaving no adhesions. There was no visible change in the condition till sometime in 1881, when he noticed that the vision in left eye began to return. On examination it was found that the opaque lens had disappeared from behind the pupil. It was afterward discovered in the ciliary region below, apparently attached, and very small. There were small floating opacities in the vitreous, and slight filamentous traces of lens capsule in parts of the pupillary space. V. was $\frac{20}{70}$ with $+ \frac{1}{12}$ s. He had been myopic. Proper glasses were prescribed, and he used his eyes freely in reading without trouble for some months. Then he began to have recurrent attacks of iritis which atropine easily controlled, leaving vision as good as before. After a time there appeared a small amber colored, flocculent, movable mass in the anterior chamber, which I thought might be a fragment of the lens that had become detached and floated forward. This seemed to act as an irritant.

December 15th, 1883, he had a severe attack of pain in O. S., to relieve which he used atropine, but this aggravated rather than relieved, as it had always done before. On visiting him, I found the eye affected with acute glaucoma, with great increase of tension, immovable pupil, shallow anterior chamber, some ciliary injection, media hazy, and the patient

prostrated and vomiting from the severity of the pain. The use of a two grain solution of eserine gave prompt and complete relief to all these symptoms for ten days or more, when they returned with violence, and the eserine lost its controlling power, and seemed to aggravate the trouble. A hypodermic injection of morphine resorted to for relief of the excessive pain not only had this effect, but for some days controlled the glaucomatous symptoms, quickly reducing the tension of the eye and clearing up the vision. This agent, however, in turn lost its control, and as the patient's general condition was becoming rapidly impaired by his sufferings, it was decided, on consultation with Dr. Agnew, to remove the eye. This was done February 9th, 1884. The remnant of the lens, very much attenuated, and measuring not more than three and a half millimetres in breadth by one in thickness, was found fastened by very delicate attachments at one edge in the ciliary region below.

DISCUSSION.

Dr. Green.—I have met with a similar case in an old woman for whom I extracted a cataract seven years ago. She had last winter an attack of acute iritis in the other eye. She recovered, and it was found that vision had improved in this eye. An examination showed the lens below, in the vitreous chamber. Two or three months later she had a second attack of iritis, which yielded to treatment with atropia. She died shortly afterwards. I mention the case as similar to the one of downward dislocation of cataract already reported. There had been no injury so far as could be ascertained.

I saw, about one year ago, an elderly man with a painful eye, in which the ophthalmoscope showed the lens fixed below in the vitreous chamber. He had had several attacks of pain, and vision was not sufficient to be of much value. Although relieved for the time by eserine of the pain, which was glaucomatous in character, he returned a month or two later asking to have the eye enucleated, which was done. After removal of the eye, the lens was found firmly attached with bands, apparently of inflammatory origin. There may have been some pressure on the ciliary region of this eye.

A third case occurs to me in which an elderly gentleman came to me, stating that he had been blind in one eye, and

that he had suddenly lost sight in the other eye. He had been to a physician, who told him that he had detachment of the retina in both eyes. I found a large floating detachment of the retina in the recently good eye. In the other eye, I saw a grey body bobbing up and down, which proved to be the lens. A glass of four inches focus gave vision almost normal. Here had been a lens floating in the vitreous chamber for years, and giving rise to no inconvenience. I have had this case under observation for eight years. Vision is still good, although the lens is lying loose in the vitreous, and on shaking the head, it sometimes becomes visible.

I mention these cases to show that these dislocations can hardly be considered to be very rare. In none of these cases was there a history of a blow or concussion to account for the accident.

MYXO-SARCOMA OF THE ORBIT.

By WM. F. NORRIS, M.D.,

PHILADELPHIA, PA.

On May 11th, 1883, Katie M., aged four months, was brought to Wills' Eye Hospital, with a prominent right eye, which the mother stated had begun to swell when the child was about two months old. This swelling first appeared in the upper lid, and was attributed to the child having stuck its finger in the eye. This lasted for almost three weeks, when the eye began to swell again, for which it was leeched; the blood flowing for several hours in such quantity as to alarm the parents.

When first seen, the upper eyelid was tightly stretched as a vascular and bluish-red membrane over the protruding globe. Upon lifting the lid, the clear cornea was visible, though almost hidden by a chemosed and swollen conjunctiva. Palpation revealed that the eyeball was surrounded by a fluctuating mass, mostly occupying the superior portion of the orbital cavity, and displacing the globe downwards. An incision was made through the upper lid, which caused the evacuation of a quantity of dark grumous blood, and a soft,

jelly-like, grayish material somewhat resembling the matter which exudes from openings made into the frontal sinuses. The child was detained in the Hospital, during which time the wound was allowed to heal. The conjunctival chemosis diminished, and allowed the cornea to be plainly seen, whilst the globe itself had partially returned to its proper position in the orbital cavity. The point of previous incision appeared as a depressed cicatrix. As it was evident, upon close examination, that a tumor was situated behind the eye, enucleation of the eyeball with extraction of the entire contents of the orbit was advised. In about ten weeks' time from the date that the child was first seen, the tumor had so increased in size that the eyeball was as prominent as ever, and turned down and in. A large hard swelling, covered by the upper lid, had made its appearance at the inner edge of the orbit. It was now determined to operate; and upon August 1st the entire contents of the orbit were evacuated, and the periosteum to which the growth in places was attached, was dissected off, and the orbital cavity packed with lint soaked in a solution of chloride of zinc. The wound healed slowly. Eventually the child returned to its home, apparently in good health; sleeping well, and having a good appetite.

In April of this year, there was a recurrence of the growth under the inner part of the lower lid, for which the mother again brought the child to the Hospital. A second operation was undertaken. The lower lid was partially dissected loose and turned back on the cheek, so as to allow free access to the tumor. The mass was cut out as cleanly as possible, and all of the remaining tissue directly adhering to the walls of the orbit was burnt with the hot iron. The lid was stitched into place, and the cavity of the orbit and the flap were dressed with a solution of bi-chloride of mercury. Except that for a day or two following the operation the flap threatened to slough, a catastrophe which was averted by the free use of hot water compresses, the case did well. The child rapidly recovered, and up to the present date has not had any recurrence of the growth, although the past re-appearance and the fact of the mother's statement that several members of her hus-

band's family have died from cancer, make an unfavorable prognosis unavoidable. The contents of the orbit were placed in Müller's fluid, and subsequently in alcohol. Sections showed that the growth consisted of round and spindle celled sarcoma, with large development of myxomatous tissue in places readily recognizable in spite of the shrinking action of alcohol.

Berlin (Graefe und Saemisch, vol. vi. p. 710) has collected nine cases of myxo-sarcoma. Three in children under ten years of age; three, between the ages of twenty and thirty; and three others, between fifty-five and sixty-seven years of age. The growths were all of rapid formation. Recklinghausen "Arch. f. Oph.," x. 2, p. 62, cites the instance of an intra-ocular tumor of a similar character occurring in the practice of Jacobson; though this was in the head of the optic nerve, and in no way connected with any orbital growth.

NOTE.—December 2, 1884. Since the paper was read before the Society, I have learned from the parents of the child, that the tumor recurred soon after leaving the hospital, and grew to the size of "a large goose egg," extending towards the lobe of the ear and causing closure of the right nostril. It ulcerated and gave rise to two slight hemorrhages. A third hemorrhage soon occurred so abundant that they were unable to stop it, and the child died within a couple of hours of loss of blood.

OSTEOMA OF THE ORBIT.

BY WM. F. NORRIS, M.D.,
PHILADELPHIA, PA.

MRS. S., aged thirty-two, a widow, with two children; a delicate, thin, and nervous woman, with hazel eyes and dark hair, came to me with the following history:—Nine years ago she commenced to lose the sight of the right eye; "feeling as if a veil was drawn over it." Later on, the eye was dislocated, causing a divergent squint. She also gave a distinct family history of phthisis.

At the time of examination, there was well marked exophthalmos of the right eye, with absolute loss of sight in it. A tumor occupying the entire floor of the orbit, could be readily felt through the lower lid. Careful examination showed that this mass was quite hard, and that it was most developed at

the inner side, at which place it felt more cartilaginous than bony. With the ophthalmoscope it was noticed that the media were clear, and that the disc, though still slightly prominent, was atrophic and bluish-green in color. The retinal veins were excessively tortuous, and there was a greenish brown spot in macula.

The left eye was healthy, with a moderate degree of hypermetropia [about 1.25 D.]; the correction of which gave perfect acuity of vision, and a good range of accommodation.

An exploratory operation was decided upon; this was done by first making a vertical incision through the lower lid, so as to expose the tumor. The mass was found to be as hard as bone, and everywhere covered with a vascular and succulent periosteum. The internal rectus was then divided and the optic nerve cut, so as to turn out the ball, in order to get sufficient room to continue the exploration further back into the orbit. The tumor was found to extend fully back to the optic foramen. The removal of the growth being agreed upon, it then became necessary to sacrifice the eyeball; this was accordingly done by dividing the other muscles and removing the globe. A gouge and a mallet were employed to separate the growth; this was accomplished by a series of sharp taps, which, without the employment of much force, readily brought away the mass in pieces. The growth appeared to be simply an enormous thickening of the floor of the orbit; the bone being cancellous in structure. After all this had been done, and the lower eyelid stitched in place, the cavity was washed with a solution one part to eight thousand parts) of corrosive sublimate in distilled water (gr. j. ad 0 i.). A compress was applied. The wound healed rapidly without any complications. The patient did not have any febrile symptoms. On the day following the operation, it was noticed that the right side of the patient's nose and mouth had lost their sensibility, which showed that the infra-orbital nerve had been cut whilst chiselling the floor of the orbit. In a few weeks, however, the sensibility in the region supplied by the injured nerve was completely restored.

DISCUSSION.

Dr. Knapp.—I should like to ask in what structure the last tumor originated.

Dr. Norris.—Apparently from the floor of the orbit. I could not say whether from the periosteum or not.

Dr. Knapp.—Did it go into the maxillary antrum?

Dr. Norris.—I did not dissect away the tissue so as to open the antrum, although I came very close to it, cutting away the infra-orbital nerve. There was loss of sensation, which, however, has been recovered. I presume that it originated in the periosteum. On microscopical section, it looked as though the trabeculæ of fibrous tissue on the periosteal side were undergoing ossification.

CLINICAL HISTORY OF A CASE OF SYMPATHETIC OPHTHALMIA.

By L. WEBSTER FOX, M.D.

On December 15th, 1883, William R., æt. 12 years, whilst cutting a cord with a sharp pointed knife accidentally punctured his left eye in the ciliary region. The wound, which was four lines in length and deep, was situated in the inner and lower quadrant of the ball near the cornea. Cold applications made and the eye bandaged. In twenty-four hours serous iritis developed, closing the pupil and obscuring vision. This condition went on from bad to worse till qualitative perception of light only remained. There was no pain, neither was the eye sensitive to light during the acute stage of the iritis. The patient was allowed his freedom during this time, and a mydriatic was not applied nor internal treatment advised. It was thought the inflammation was due to a "cold" and would soon pass off. On January second the boy was sent to school, the eye at this time still very much inflamed but without pain, it being protected by a bandage. On the fourth of January he complained of a dimness obscuring his distant vision in the right eye. His mother (a poor widow) sought the aid of an ophthalmic expert, who, recognizing the gravity of the case, at

once instituted vigorous treatment. The eye soon became as bad as its fellow; when on March 28th, 1884, the date the patient was first seen by myself, the conditions were as follows: Left eye (injured one), cornea hazy, keratitis punctata, balloon shaped iris, degenerated in spots, occluded pupil, sclerotic congested, slight perception of light. The cicatrix of the wound well defined. The right eye similar in appearance, excepting the pathological conditions more pronounced. On the iris, which was very much thickened, could be discerned by oblique illumination new formed blood-vessels. There was barely qualitative perception of light. During the inflammatory process the patient suffered little or no pain, light however could not be borne. We could only confirm the prognosis given by the former attending physician, but as considerable inflammation as well as inflammatory deposits remained, we instituted mercurial treatment guarded by opium, with instillations of atropia, as well as applying leeches to temples. This treatment was forced to salivation, but did not modify the virulency of the disease.

On April 19th my friend Dr. K. B. Schulze, under whose care the patient was at this time, wrote me that hypopyon made its appearance in the right eye during the last few days; some slight supraorbital pain. The mercurial treatment both internally and externally was resorted to, in small but frequent doses; the inflammation seemed to respond to the treatment, for in three days the pain disappeared, the thickened and yellowish brown iris assumed a more normal shape and color. During the following few weeks the sclerotic congestion disappeared, becoming white, lachrymation, which at times was profuse, now disappeared entirely, the eyes assuming a normal appearance but vision gone.

On June 21st I saw the patient and noted the following. Right eye, all traces of inflammation gone, but atrophied to one half its former size. No p. l. Left eye evidently becoming atrophic, perception of light (?) in the upper field, sclerotic white.

The rapid and virulent course of this case of sympathetic ophthalmia makes it worthy of being placed on record. In

three weeks from the date of injury, vision was practically gone; at the end of six months atrophy of one eye had taken place, with a like progressive condition developing in the other. Had active treatment been forced at the time of the injury, the result might have been modified, possibly averted. It was only when the case was almost hopeless that the hydrargyrum treatment was instituted, which did not check the disease nor even modify it, the inflammation only subsiding when all the inner tissues of the eyes were destroyed.

TWO CASES OF ORBITAL ABSCESS.

BY J. A. LIPPINCOTT, M.D.,
PITTSBURGH, PA.

THE following cases are reported, in the first place because retro-ocular abscess is among the rarer affections that come under our notice, and in the second, because the cases are not without inherent interest, one of them illustrating what I believe to be rather uncommon, viz. very complete recovery, and the other exhibiting the disease at an unusually early age.

In September, 1877, J. L. D., son of a medical friend, a child of rather feeble powers of resistance, one of the class that "take everything," was recovering from a severe attack of erysipelas of the face and scalp, when a slight swelling of the right upper lid attracted his father's attention. When I saw the case—on the following day—I found a small abscess of the lid which I opened with a free incision, but which contained only a few drops of pus. There was at that time no displacement of the eyeball nor any loss of mobility, but there were more pain and tenderness than could be accounted for by the abscess in the lid. The general condition was low. The patient was feeble, irritable and emaciated. Pulse weak, quick and rapid. There was decided anorexia; but great thirst, high temperature, and other febrile symptoms were

not present. The patient was taking tonic doses of quinine and iron. After opening the abscess a small poultice was applied and the tonic treatment continued as before, in the hope that the trouble was merely superficial, and that the *noli me tangere* spirit of the patient was owing rather to his irritability than to any decided tenderness, more especially as he seemed to be as little desirous of being touched in one place as another.

The superficial abscess healed up rapidly, but the pain and tenderness seemed to slowly increase, although no marked symptoms of inflammation manifested themselves. The patient was now put on the syrup of the iodide of iron, gtt. xv. q. t. h., and the quinine increased from four to six grains daily.

On the 5th day after I first saw him the eyeball seemed to be very slightly protruded, although its mobility was perfect. Twenty-four hours later, a sudden and rapid increase of the exophthalmos took place, and was accompanied by markedly increased intensity of the symptoms of febrile disturbance. The eyelids were swollen and discolored, and there was almost complete ptosis. The eyeball was protruded more than half an inch, scarcely movable, and its axis was directed strongly downwards and outwards. There was slight chemosis of the conjunctiva. The cornea was partially exposed, but the exposure had not been of sufficient duration to materially affect its transparency. The pupil was rather small and feebly responsive. A satisfactory view of the fundus was not attainable under the circumstances, but I saw enough to be certain that there was at least no gross lesion present. Besides, the sight appeared unimpaired, and diplopia was observed. There was considerable tension and severe pain. Tenderness was especially marked in the upper and inner orbital region. The child was placed under ether, and an exploratory incision, as recommended by Wells, was made with a narrow bladed tenotome, above and a little to the inner side of the globe, under the upper lid which was well elevated. As the blade came out clean, a second puncture was made, a little further to the inner side, which revealed the presence of pus. The puncture

was converted into a pretty free incision by means of a straight bistoury introduced with the plane of the blade held parallel to the orbital wall, whereupon about a dram and a half of very thick, dirty, and foully-smelling pus came welling up to the surface. A great decrease of tension followed, and some degree of recession of the globe. The propriety of inserting a tent was discussed, but we decided to dispense with it. A large poultice was applied in such a manner as to exert some pressure.

The following day the swelling of the upper lid was greatly intensified, and the conjunctival chemosis was also much increased, owing no doubt partly to the traumatism of the operation, and partly to the irritating effect of the escaping pus. However, under the influence of the supporting treatment and the continuous application of poultices and pressure, the swelling of the lids and conjunctiva gradually subsided, and the eyeball by degrees sank back farther and farther into the orbital cavity. About five weeks after the operation the mobility of the globe had fully returned, and the diplopia had completely disappeared. The exophthalmos continued to diminish gradually, till about a year ago.

Forty-eight hours after operating upon the right eye, it became necessary to evacuate an abscess which had formed underneath the left globe, and which contained about half a dram of pus. No further treatment was required.

A comparatively recent examination of the patient showed no trace of the disease except a scarcely appreciable degree of protrusion of the right eye; the fundus was normal, and the vision was $\frac{20}{xx}$.

CASE II.—Annie R., scarcely twelve months old, was sent to me September 14, 1880, by Dr. J. S. Lusk, of Harmony, Pa., who subsequently gave me a history of the case, from which I make the following extract: "When I first saw the child, on or about the 24th of August, there was great swelling of the eyelids (on the left side) and chemosis, the conjunctival membrane a pale red, pupil natural, cornea clear, eyeball in its natural position. No purulent discharge, and no redness of the lids. I saw it again on the 27th. No

change except an increase of the swelling. Still no discharge. September 12th, was called out to see the patient with Dr. Crawford, who had been sent for the night of the 1st inst. as the child was suddenly attacked with severe vomiting and purging. I found a marked change—the eyelids enormously swollen and very red, great chemosis, and the eyeball protruding fully to the extent of its diameter, the displaced globe occupying the outer half of the swelling, the pupil widely dilated and looking outward at an angle of 45°. The cornea was clear, and there was a very slight muco-purulent discharge. Diagnosing an intraorbital abscess, we sent the case to you."

When the little patient was brought to my office, the condition was about as above described, except that the divergence was not so pronounced, and the pupil was of natural size and responsive. The pain was apparently not very extreme, as the child, when undisturbed, lay quietly in her mother's arms; but on the approach of any one else she struggled vehemently and developed a pulmonary capacity quite disproportionate to her years; so that ophthalmoscopic investigation was rendered impossible. The pulse was 140, temperature 99°. The eyeball had suddenly become protruded about forty-eight hours before. Previously to that, while the diagnosis was still uncertain, the treatment had consisted of scarifications and the application of a mild astringent collyrium.

Mother and child were at once sent to the Western Pennsylvania Hospital. In the afternoon, the resident physicians assisting, ether was administered, and an aspirating needle introduced above the globe under the upper lid. On reaching the abscess cavity, as was indicated by the cessation of resistance, a quite thin, dark brown, and very fetid pus began to flow from the needle. The puncture was followed by an incision with a narrow bladed bistoury, and more than a dram altogether of fluid allowed to escape. The eyeball receded somewhat, and the tension of the tissues was decidedly lessened. A large poultice was applied, and a quinine and iron mixture prescribed. The diarrhœa proved quite obstinate, but finally yielded to bicarbonate of sodium and Dover's powder.

The day after the operation the lids were more swollen, but the general condition of the patient was much improved. A week later, as the opening had closed and as there was manifestly still pus behind the globe, the child was again anæsthetized, and a bistoury puncture made below and a little to the outer side of the eyeball. This opening was made larger than the previous one. The pus which now escaped was quite different in character from that removed at the first operation. It was thick, creamy, and not disagreeable in odor. A carbolized oil tent was inserted. Pus continued to escape for two weeks, when the opening closed up. At this time the poulticing, which had been kept up uninterruptedly, was discontinued, and a cold compress bandage substituted. But as the eye soon showed symptoms of irritation, poulticing was resumed, and continued for two weeks longer.

On the 28th of October the patient was discharged and taken home. There was now no great swelling of the lids; the exophthalmos was comparatively slight, and the mobility of the eye seemed perfect. I found it impossible to determine the vision; and the little one had formed an opinion of me which effectually precluded a look at the fundus oculi.

A year later the condition of the eye was not materially changed. Subsequently to that time I had no opportunity of examining the patient until two weeks ago. *Status præsens.* Exophthalmos about $\frac{1}{16}$ of an inch. Considerable swelling of the eyelids and partial ptosis. Between the lower lid and globe is a freely movable, pale and gelatinous looking, lobulated mass, nearly $\frac{3}{4}$ inch long and about $\frac{1}{4}$ inch wide. The mother states that there is occasionally some discharge (mucous), although there is none at present. The eyeball is perfectly clear and healthy in appearance. Mobility complete. Pupil normal in size and responsive. Vision limited to light perception. Media transparent. Disc very white and atrophic. Retinal vessels, especially arteries, much contracted.

I may add, in regard to the etiology of the case, that there was no inherited taint of any kind, the only assignable cause being exposure to cold.

DISCUSSION

DR. THROBALD.—Quite recently I had a very severe case of this character in the person of my assistant in the hospital. He is a physician aged about thirty-five, and was run down from over work. He first complained of pain about the eye, and there was observed slight chemosis of the conjunctiva and perhaps a little prominence of the eye ball. This went on increasing, and four or five days later, deep fluctuation was found over the ball, to the inner side. It would have been almost impossible to make the opening under the upper lid, for the ball was prominent and the lids were tense. It seemed, therefore, better to make the incision through the upper lid. A deep incision was made and there was a free flow of creamy pus. Poultices were then applied. The discharge continued and the eye began to recede. Two days after the opening had been made, fluctuation made its appearance below. This point was opened. After this he made a rapid recovery. The interesting point about this case is, that although there was very decided exophthalmos and disturbance of vision, the protrusion entirely disappeared and vision was perfectly restored. There were no changes discoverable in the fundus.

EXPERIENCES IN REFRACTIVE CASES.

BY W. W. SEELY, M.D.,

CINCINNATI, O.

FROM my own experience, I am satisfied that while practice based on ophthalmoscopic examination and test glass trials answers in a large number of cases, it does not answer in an equal, if not still larger number.

Assuming that it is possible to determine the refractive state ophthalmoscopically, perhaps a violent assumption, practice based on such determination would fail utterly in many cases, and would only succeed in others after tedious renewals of glasses. Hence, determining the refraction by the ophthalmoscope, and acting on it, as a matter of routine practice, I am persuaded is the foundation for rendering our successes and failures about equal.

I am not discussing the determination of the refraction, except in its relation to practice; and it is from this position that I will speak of a few special points.

The intimate relation existing between strain on the eye and diseases of this organ is not only a new question, but one of constantly increasing importance, and it, in connection with that of refractive troubles, *per se*, is filling the consultation rooms of oculists with the most complicated and perplexing cases that present themselves. As the general profession becomes better able to manage ordinary diseases of the eye, they likewise become better able to discriminate between what is on the surface and what lies deeper, and so no longer slur over cases for weeks and months with collyria and pomades because they present marginal lid troubles or conjunctivitis, or interdict the use of the eyes because fatigue is felt.

A small amount of myopic astigmatism with blepharitis or without, with asthenopic symptoms or without.—Under this heading I have to say, that for a working basis, I regard it wise to call in question a small amount of myopia, especially of myopic astigmatism, and immediately test whether it is real or assumed, by paralyzing the accommodation.

(I will state here that I have only taken a few representative cases readily found under the first few letters of my case-book, so as not to be tedious.)

In October, 1883, Mr. C., a young man of twenty, complained of fatigue on use of the eyes. Examination seemed to show V. $= \frac{20}{20}$ — (minus), vertical lines seen best, and only corrected with $+ 0.5_c$ ax. 90° R. E. L. E. apparently horiz. lines best, and V. $= \frac{20}{20}$ —, correction only made with $+ 0.5_c$ ax. 90°. He showed me a pair of glasses which had been prescribed by a gentleman in an eastern city, of $- 0.5_c$ ax. 90°. I remarked to him that they could not be correct, that he probably needed a plus cylindrical ax. horiz.; when he replied, "I have a pair of plus cylindrical given me by another gentleman in the same city, but I can't wear them." These I found to be $- 0.5_c$ ax. 10°.

On paralyzing the A. I found: L. E. V. $= \frac{20}{70}$ and full correction $+ 1._s \frown + 0.5_c$ ax. horiz. R. E. V. $= \frac{20}{70}$ and full cor-

rection $+0.75_c \bigcirc +0.5_c$ ax. horiz. $+0.5 \bigcirc +0.5_c$ ax. horiz. each eye gave him perfect relief.

Mixed Astigmatism.—Mixed astigmatism is recognized by all as being comparatively of infrequent occurrence; but I am persuaded from my own experience it is even more infrequent than we have been willing to admit. It may seem startling, that I have never seen a single case where it was a fixed condition.

S. D., aged fourteen, came to see me in 1882. Examination revealed the following: L. E. -2.5_c ax. horiz. and $+1.5_c$ ax. 90°. R. E. $-3._c$ ax. horiz. and $+0.75_c$ ax. 90°. After several applications of duboisia, the following was revealed: L. E. $+2.75_c$ to $+3._c$ ax. 90°. R. E. $+2.5_c$ ax. 90°. This correction remains perfect.

F. R. C., aged eleven, came in October, 1883. V. = $\frac{20}{70}$ each eye without glasses. He was a sharp witted boy; but the most perfect correction I could get out of the case was emphatically salmagundian, $-3.$, ax. 10° and $+1.$, ax. at right angles, with V. = $\frac{20}{30}$ —. Under a few applications of duboisia, V. = $\frac{20}{30}$ + and lines alike, with $+3._c$ ax. 90°. The glasses gave perfect comfort, and now V. = $\frac{20}{20}$ —.

The following was apparently a case of simple hypermetropic astigmatism in one eye, and mixed in the other:

L. B., aged thirty. June, 1883. L. E. V. $\frac{20}{30}$ — and vert. lines best. Perfect correction with $+0.5_c$ ax. 10°, though accepted more readily $+0.75_c$ ax. 10°. This eye under paralysis showed full correction to be $+1.5_s \bigcirc +0.5_c$ ax. horiz. R. E. V. = $\frac{20}{30}$, and only increased to $\frac{20}{20}$ with $1.$, ax. 175° combined with $+1._c$ ax. at right angle. Under paralysis this eye proved to be precisely the same as the left, i. e. $+1.5_s \bigcirc +0.5_c$ ax. horiz. When seen February, 1884, the glasses given ($+1._s \bigcirc +0.5_c$ ax. horiz.) had been worn with perfect satisfaction.

Influence of lack of muscle balance on the refraction.—Under this head I wish to give a few cases illustrative of the apparent causative relation existing, at least in certain cases, between insufficiency of the internal recti and spasmodic myopia.

Miss H., aged twenty-five. January, 1882. V. = $\frac{20}{70}$ about in each eye, and best correction made with $0.5_s \bigcirc 0.5_c$ ax.

horiz., but V. could only be made $\frac{20}{50}$. After three days of duboisia V. = $\frac{20}{20}$ each eye.

This case was allowed to go without assistance, though a record of lack of muscle balance was made, as well as the prediction that the myopia would return. In September, 1882, a re-examination showed almost precisely the same state of things as on first examination. I then insisted on putting on prisms, and gave 1° each eye, bases internal. The case was not seen again till early in 1884, when V. = $\frac{20}{20}$ each eye, and prisms still worn with comfort.

Miss D., aged 20. December, 1883. L. E. V. = $\frac{20}{40}$ —, and $\frac{20}{20}$ with -1.5_s. R. E. V. = $\frac{20}{40}$ —, and $\frac{20}{20}$ with -1.5_s.

This patient used at home for ten days a four gr. solution of atropine, and, on her return, L. E. V. = $\frac{20}{70}$, and $\frac{20}{30}$ with $+ 1._s$. R. E. V. = $\frac{20}{70}$, and $\frac{20}{20}$ with $+ 1.25_s$.

Record [1] on first examination of insufficiency, for distance ext. recti = 12°, and int. recti = 8°. $+ 1._s$ was now ordered for all purposes, but as soon as the paralysis passed off the spasmodic myopia returned.

Atropia was used for ten days again, her father being a physician, and the eyes tested under paralysis by myself. V. = $\frac{20}{200}$ each eye, and corrected to $\frac{20}{30}$ with $+ 1.5_s$. Same glasses continued. This course was persisted in for several months, till I finally ordered $+ 1._s$ combined with 1° prisms bases internal.

The patient had a slight return of the spasm by the time she got the glasses, but the atropine was used, and the eyes allowed to recover under the glasses, which have been worn since with the greatest comfort, and no return of the spasm as an examination in early part of June of this year showed.

T. K., aged sixteen. April, 1883. L. E. V. = $\frac{20}{200}$, and $\frac{20}{20}$ with -1.5_s. V. = $\frac{20}{30}$, and $\frac{20}{20}$ with -0.5_s. Slight blepharitis, and considerable fatigue. Both ext. and int. recti = 10° in the distance, but single vision (Graefe test). Under duboisia once, V. = $\frac{20}{20}$ R. E. and $\frac{20}{50}$ L. E.

[1] For routine practice in the distance (20 ft.) I use a small jet of gas, below level of patient's head, observing what degree prism can be overcome with base external and internal. Line and dot for near test.

It required eight days to make V. = $\frac{20}{30}$ with L. E. The right only required a repetition of duboisia once or twice, and V. remained $\frac{20}{30}$, but for months, as soon as the mydriatic would pass off, spasmodic M. returned in L. E. I used atrop. for six weeks or two months, continuously, and still on recovery spasm would return.

In October, 1883, V. = $\frac{20}{30}$ in L. E. I now ordered plain prisms 1°, bases internal, and V. at no time since the glasses has been less than $\frac{20}{30}$, and of late has constantly been $\frac{20}{20}$, and the blepharitis has entirely disappeared and the eyes are used with perfect comfort.

S. E., aged sixteen. June, 1883. L. E. V. = $\frac{20}{70}$, and $\frac{20}{20}$ with $-1._8$. R. E. V. = $\frac{20}{50}$, and $\frac{20}{20}$ with -0.5_8. Muscles = 8° in the distance, but easier with ext. than int. recti. Single V. near. I regarded the case as one of spasmodic myopia, and put the eyes under duboisia till V. = $\frac{20}{20}$.

In December, when patient was seen again, V. = $\frac{20}{50}$ L. E. and $\frac{20}{40}$ R. E. Slight blepharitis, but little or no complaint of fatigue. V. was now made $\frac{20}{30}$, and prisms 1° bases internal given.

June 2d, 1884. V. = $\frac{20}{20}$, glasses having been worn constantly.

In conclusion I have to say that my results, since insisting upon, first, a complete knowledge of the refractive state, and second, putting the eyes totally at rest for a few days by paralysis, have been infinitely more satisfactory than in former years. I am thoroughly persuaded further that no case of myopia should be given glasses, except under complete paralysis and a test of the muscle balance.

DISCUSSION.

DR. MITTENDORF.—My experience in regard to mixed astigmatism is not quite like that of Dr. Seely. I remember one case, in which a gentleman had been given a — .24 s., but this did not give good vision. I examined him carefully, and found that he required a — 10 D. c., combined with + .75 c. With this the vision was $\frac{20}{15}$, before it was $\frac{20}{0}$.

In regard to giving glasses for asthenopic trouble, I have

found that prisms are often required, not only with the base in or out, but also either upwards or downwards, as the case may be. This is not done to produce monocular vision, for if the prism is too strong the patient complains of the disturbance. I give a prism of one or two or more degrees, according to the difference in the height of the two eyes. In order to relieve asthenopic symptoms, the muscles should be exercised. Not only by Dyer's method, but also by exercising the muscles of the whole body. In many cases of severe asthenopia, the greatest relief has been obtained by having the patient take boxing lessons. Even in young ladies I have had good results with this method.

CASES OF DISEASE OF THE FRONTAL SINUS.

By CHARLES J. KIPP, M.D.,
NEWARK, N. J.

CASE I.—ABSCESS OF FRONTAL SINUS, ETHMOIDAL CELLS AND SPHENOIDAL SINUS.

John Bredfelt, fifty-four years of age, in good health, consulted me in March, 1883, with regard to double vision and pain in the head. He had suffered for many years from frontal headache, but had otherwise always enjoyed good health. A year ago he first noticed the diplopia, and since then a gradual protrusion of the eye has taken place.

I found that the left eye was pushed downward, outward and slightly forward, the cornea of this eye standing about 1 cm. below that of the other eye. The mobility of the eye was decidedly impaired upward and inward. The eyelids were normal, except that the upper was rather fuller than that of the opposite side. Palpation discovered a nodular tumor of irregular form which was adherent to the upper half of the inner and nearly the whole of the upper margin of the orbit. It projected about 1.5 cm. towards the eye, and extended backward in the orbit as far as the finger could reach. It felt hard and unyielding to the finger. No fluctuation could be discovered. No pulsation of the tumor could be detected.

The sight of this eye was normal, and the ophthalmoscopic examination revealed no abnormity, except slight hyperæmia of the retinal veins. I supposed that the tumor was a sarcoma connected with the periosteum of the orbit, and advised its removal.

The sight of the right eye was perfect; it was slightly myopic. A few days later, the patient being under ether, I made an incision along the upper margin of the orbit, exposing the tumor. I then introduced my finger to ascertain the character and extent of the tumor, and learned that it was in parts as hard as bone. While still exploring, I felt a break in one of the hard parts of the tumor, and a moment later a considerable quantity of very fetid pus escaped from the incision. I now endeavored to ascertain the extent of the abscess by means of a probe, and found it to extend so far upward and backward that I concluded to abstain from further exploration. I made a free opening in the wall of the abscess, evacuated a large quantity of offensive purulent matter, and introduced a large drain-tube into the opening. When the patient became conscious he complained of a horrible odor in his nose, and expectorated much fetid pus. After this the cavity was washed out daily with a warm and very weak solution of salt, some of which escaped from the nose.

For ten days after the operation the patient was apparently doing remarkably well, the eyeball had resumed its normal position, the diplopia was less, the headache had almost entirely disappeared and the patient was entirely free from fever. But on the eleventh day he showed symptoms of pneumonia, which in spite of the most assiduous attention ended fatally on the 17th day after the operation.

The autopsy was made on the following day by Dr. R. Staehlin, who had treated him for the pneumonia, and myself. The examination showed that the frontal sinus, the ethmoidal cells and the sphenoidal sinus had been converted into one large cavity, which contained some pus in its lowest part. The bony walls of the cavity were carious, and numerous sharp spiculæ of bone projected from the walls. The inner surface of the cerebral plate of the horizontal process of the frontal

bone was discolored in several places, but not roughened. The dura mater over these places as well as everywhere else was normal, and the other meninges and the brain itself were apparently healthy. The floor and outer wall of the abscess consisted of very much thickened periosteum, in which a number of thin scales of bone were imbedded, and in one of these the opening was found from which the pus had escaped during the exploration. The lungs showed a simple pneumonia; there were no abscesses, and none of the other usual appearances of metastatic pneumonia.

Remarks.—The mistake made in the diagnosis of this case seems unavoidable. The slow development of the tumor, its size, hardness and inelasticity, the irregularity of its surface, and the absence of all inflammatory symptoms, made it extremely probable that the tumor was a fibroma or sarcoma originating in the periosteum of the orbit. Fortunately, this error in diagnosis resulted in no harm to the patient, for, had I known the true character of the disease, I should have operated as I did, but I should have been more guarded in my prognosis. In no other case have I seen the bony partition between the frontal sinus, the ethmoidal cells and the sphenoidal sinus so completely destroyed as in this.

CASE II.—DISTENSION OF THE FRONTAL SINUS.—CURED BY APPLICATIONS TO THE MUCOUS MEMBRANE OF THE NOSE AND PRESSURE ON THE TUMOR.

Mrs. N. A. W., fifty-seven years of age, a large and healthy looking woman, consulted me with regard to a painful swelling below the left eyebrow, in October, 1882. According to her statement she had for many years suffered almost constantly from a severe pain in the left frontal region. The tumor began to appear six months ago, and had since steadily increased in size. She had not sustained any injury to the nose or head, but had always had naso-pharyngeal catarrh.

The tumor was about the size of a hickory nut, and was immovably attached to the inner upper angle of the orbit. It extended into the orbit as far as the finger could reach. The surface of the anterior part was smooth, that of the posterior

portion nodular. The tumor was quite hard, but on deep pressure fluctuation could be felt. The skin over the tumor was normal and not adherent to the swelling. The eyeball was pushed slightly downward and outward, and its movement upward and inward was somewhat impeded. The diplopia did not annoy the patient very much. The examination of the fundus of the eye showed nothing abnormal. With the exception of great swelling and congestion of the mucous membrane, nothing abnormal could be detected in the nose.

There could be no doubt that the tumor was caused by the distension of the frontal sinus, and I therefore advised the patient to have an operation made for the purpose of establishing communication between the nose and the frontal sinus. This the patient declined to have done.

I did not see the patient again till July 21, of the following year. At this time the tumor was somewhat larger than it had been when I first saw her, but otherwise it had not changed. There was now in addition much injection and oedema of the ocular conjunctiva and a shallow ulcer in the center of the cornea. The eye became painful several days ago, and the redness was first noticed two days before. The patient attributed the eye trouble to overheating while working in the field, and was sure that the eye had not received a traumatic injury. I prescribed fomentations with a warm solution of boracic acid, and instillations of atropia. Under this treatment the ulcer healed completely in about twenty days. While under treatment for the corneal ulcer I frequently examined the tumor, and on one of these occasions felt it to give way, and on pressing somewhat harder I evacuated the cyst almost entirely. At the same time the patient felt something exceedingly disagreeable in taste in her mouth, and expectorated a considerable quantity of very offensive, blood-, mucopurulent matter. I now learned from the patient that the swelling had "broke inwardly" several times during the last few months, and the discharge had on each of these occasions been exceedingly offensive.

I applied solution of nitrate of silver to the mucous membrane of the nose, and frequently washed out the nose with

warm salt water, and at the same time instructed the patient to evacuate the cyst by pressure very frequently through the day. For some weeks after this the cyst refilled very quickly, and at one time an inflammation of the skin over the tumor was developed, which spread also over the right half of the forehead. Under the application of ice compresses this subsided, however, very quickly.

Until the first of May, 1884, the patient was free from pain in eye and forehead; the cyst became distended but rarely, and when it did it could be emptied by slight pressure. Although always of a disagreeable taste and odor, the discharge had not been offensive for several months. The diplopia had entirely disappeared.

In the early part of May, while apparently in excellent health, she had a severe chill, followed by fever and sweating. I saw her on the following day, but could find no marked change about the frontal bone. The ophthalmoscopic examition revealed indistinctness of margin of optic disk, but no other abnormity. Quinine was given for a week, and no other paroxysm of fever occurred.

Since then the patient has enjoyed excellent health. The tumor has not reappeared for many weeks, and the optic disk is again entirely normal. The skin over the inner upper margin of the orbit is somewhat thickened, but otherwise normal. The defect in the inner upper angle of the orbit is about the size of a ten cent piece, and its margin is markedly nodular, several of the nodules being about the size of a pea. The end of a finger can almost be pushed through the defect into the frontal sinus. The mucous membrane of the nose is still swollen, although the swelling is much less than it was six months ago. Now, it is not an uncommon occurrence for air to enter the frontal sinus and distend it when she blows her nose.

Remarks.—This case seems worth reporting, as it shows that in some cases, at least, this disease can be cured, without resorting to an incision in the outer wall of the distended sinus. In nearly all of the cases that I have seen in which the sinus was thus opened, a permanent fistula remained, caus-

ing much annoyance and some deformity, and any method of treatment not involving such an incision, and yet giving as good results, will, I have no doubt, be welcomed. It can certainly do no harm, if it does no good, to endeavor to cure or at least improve the morbid condition of the lining membrane of the nose which will be found to be present in most, if not all of the cases of distension of the frontal sinus. Attempts to empty the sinus through its obstructed or closed passage into the nose by digital pressure on the swelling should be made from time to time, and after the sinus has been once emptied it should be evacuated at short intervals. If, after a fair trial of this treatment, the distension continues, the old method of treatment may be resorted to.

A CASE OF GLIOMA OF THE RETINA (DOUBLE-CONGENITAL).

By WILLIAM S. LITTLE, M.D.,
PHILADELPHIA, PA.

A FEMALE child, eight months old, was seen at The Eye Clinic, Jefferson Medical College Hospital, by Prof. William Thomson, M.D., June 11, 1882, glioma of the retina of both eyes being diagnosed; the size of the growth in the right eye was quite marked, giving a white reflex from the pupil, and most prominent at the temporal side; sight was lost in this eye; the left eye gave a white reflex to the temporal side only; some vision remained in this eye. An unfavorable prognosis was given, as far as sight was concerned, and later a fatal result was to be expected.

Enucleation of each eye was advised, but all interference was rejected.

Nothing further was seen of the case, till I was requested by Dr. O. H. Fretz to see the case on March 30, 1884, a fatal result being soon expected. The child was the youngest of eight children, the eldest having died of yellow fever in Peru; all the others were well and hardy. The grandparents

on both sides died of old age. The father had lived in various parts of the world, but denied all illness; the mother was in good health. The mother stated that the child, till five months of age, had no ocular symptoms; then the conjunctiva of each eyeball became congested. Could see at that time, and with the left eye when seen at the hospital, at eight months of age. At one year it was entirely blind. In September, 1883, the right eye increased in size, a swelling developed on right temple, left temple also developed a tumor, later a second one, and are now larger than on the right temple, being the size of a goose egg. Recently the glands of the neck on the left side became involved and have broken down. March 28, 1884, the right eyeball had yielded to the pressure of the mass, the cornea breaking down; hemorrhage occurred, the eyeball being covered by the lids till the latter part of February. When seen a yellowish mass occupied the corneal position, projecting an inch forward. The left eye still gave a red reflex up and in, a whitish reflex on the temporal side and below. No cataract, pupil immobile and about of normal size. The child had refused nourishment of late, but was not very emaciated.

The circumference of the head in the region of the tumors was $20\frac{3}{4}$ inches. The tumors were hard, and pressing forward from within the cranium. There was an offensive discharge from the nose, the palate was flattened from above downward, teeth in upper jaw loose, and pressed forward out of place.

No surgical interference being allowable, treatment of mercury and iodide of potassium was suggested, also cod liver oil to be rubbed into the skin, and feeding per rectum.

Pictures of the case were taken a week after I saw the patient.

The child died, apparently from suffocation, May 17, 1884, two years and seven months of age. No post-mortem was allowed. Hearing had been normal, on the right side at least.

In a case recently reported by Mr. Snell, at a meeting of The Ophthalmological Society of the United Kingdom, the mass in each eye was recognized at three months of age.

Child seen by Mr. Snell when it was eight months old; the right eye was removed; three years later the left eye enucleated; eighteen months later the child died, a tumor projecting from the forehead; there was no recurrence in the orbits. The age at death was five years and two months. Enucleation evidently prolonged life in this case; the rejection of any surgical interference by the parents of the case reported, did not allow this to be shown, but as fatal results are reached, in congenital cases, so rapidly, operation becomes almost questionable; when recognized early it is advisable. An interesting feature in this case is, that while the right eye was more involved, the tumors on the left side of the head were larger than the one on the right side, and yet the mass in the left eye developed very slowly, or almost remained stationary.

In two other cases seen at the Clinic in older children, and only one eye involved, the operation was refused; done, however, later by another surgeon, after the eye had broken down, and fatal results soon followed.

DISCUSSION.

DR. THEOBALD.—I have a case, which is still under observation, in which I enucleated an eye for glioma, six years and a half ago. So far there has been no return of the disease. There has been, however, some complaint of uncomfortable feelings in the head, and of headache. Iodide of potassium has been given with relief to these symptoms.

In another case in which I enucleated the eye some years ago, the orbit remained healthy, but twelve months after the operation the patient was seized with an obscure attack. There was evidently something wrong about the brain, and the child died in twenty-four hours. The case that is still living is a lad about twelve or thirteen years of age. The other case was a child about nine or ten years.

DR. MITTENDORF.—I should like to ask whether any member has had a case in which the child has not died after operation for glioma? The operation, although it prolongs life, does not save it. It is unusual for the disease to develope so late as the eighth or ninth year. In the majority of cases it appears before the fifth year.

DR. MATHEWSON.—I think that some of the rare cases in which there has been no recurrence of glioma after enucleation may be accounted for on the ground that sometimes we may be mistaken in the diagnosis, and what appears to be glioma may eventually prove not to be so. I have in mind the case of a little girl ten years of age, in whom the father, a physician, had at birth noticed something peculiar about one of the eyes. The eye was examined by a number of prominent ophthalmologists, and it was the opinion of all that it was a glioma. At first, I had not the slightest doubt but that this was its nature. When first seen the anterior surface was much whiter than it was later. The vessels seemed to extend over it. The father would not allow the removal of the eye, and the condition has never developed further. The eye is somewhat smaller than the other, of course without sight. The question is, what is it?

DR. MITTENDORF.—Nearly all of us have met with these cases of spurious glioma. I have in mind a case in which nearly all the physicians of the New York Eye and Ear Infirmary considered the condition glioma. The parents objected to an operation. This was seven or eight years ago. The child is still living, and has the same condition in the eye. This was evidently a case of spurious glioma.

DR. KNAPP.—These cases offer a comparatively good prognosis. In regard to Dr. Mathewson's statement that glioma is incurable, I would say that, although extremely rare, still there are well authenticated cases of permanent recovery from true glioma. In my own experience there has been only one case, but I have followed this case for fourteen years. This was a child whose eye I removed in New York. The diagnosis had been made by Dr. Noyes, myself, and all who saw it. The anatomical examination showed the gliomatous structure very clearly. That boy is still living, and has developed into a healthy youth. He has had neither a local nor a general relapse. These cases are, however, exceptional, and I think that there are not a dozen on record. Græfe said glioma of the retina was always fatal. In his experience the longest period was four years. In the case which I have spoken of, and reported in the Archives of Ophthalmology and Otology (vol. ii. 1. p. 36, 1871), the child was four years old. I do not think that the disease was congenital.

DR. LITTLE.—I think that where the disease is congenital it developes very rapidly.

DR. HOWE.—I would call attention to the fact, that Dr. Agnew presented to the Society the photographs of a child in

whom both eyes had been enucleated. I have had occasion to see that child within three months. The case was reported nearly three years ago, and the anatomical examination showed distinct glioma. I can readily understand how mistakes may occur.

TWO CASES OF SWELLING OF THE OPTIC PAPILLA—POSSIBLY CONGENITAL.

By GEORGE C. HARLAN, M.D.,

PHILADELPHIA, PA.

THOUGH optic neuritis without impairment of the vision in its early stages is a common enough occurrence, the following two cases seem worthy of record, on account of the high degree of sight retained and the length of time they were under observation without change in the ophthalmoscopic appearances, and without the development of any other symptom.

J. C. S., a student, twenty years of age, applied to me on October 31, 1883, merely to be assured that he was wearing proper glasses. He stated that he had been short-sighted since early boyhood, and had been wearing glasses constantly for about four years. He had increased their power several times, but had worn the present pair for a year. They were —3 D.

With —3.50, he had V. = $\frac{20}{16}$, and P. 4″. No asthenopia. Field and color normal. No headache. On making an ophthalmoscopic examination, I was startled to find a swelling of between three and four dioptrics of both discs. Their margins were indistinguishable, and marked striations extended well on to the retina. The discs were of a dirty gray color, but there was no marked capillary congestion. The rest of the fundus, though considerably distended, was nearly normal. Veins slightly enlarged and contorted.

I advised him to be very cautious in the use of his eyes, and to report again in a few weeks. He did not appear, however, until the 8th of February, and then only on account of a slight

conjunctivitis. He assured me that he had been reading six hours a day since his first visit, with perfect comfort. There was absolutely no change in vision, refraction or ophthalmoscopic appearances.

A few days afterwards, he was seen by Drs. Norris and Schell, who agreed entirely with my opinion of the ophthalmoscopic appearances and my measurement of the discs.

The second case gave me great anxiety, on account of accompanying symptoms of an alarming character. The patient in this instance was hypermetropic.

Miss C., fifteen years of age, well developed, of healthful appearance, menstruating normally, and not of specially nervous temperament, applied to me on April 7th. For several months she had been subject to severe headaches, frontal and occipital, and pain in the eyeballs increased by use of eyes. There had been no nausea, but occasional dizziness, and, on several occasions, decided double vision, lasting only for a few seconds. The diplopia was vertical, and the two images were seen with great distinctness. V. $= \frac{20}{20}$. Field normal. Balance of external muscles correct. O. D. under atropia, H. 1.50. With ophthalmoscope + 1.50 at macula, and + 3 at disc. Margins indistinct and striated. O. S. under atropia H. + 1. Ophthalmoscopic appearances the same as in O. D.

She was ordered to wear weak convexes, lightly smoked, and to discontinue all use of the eyes. Bromide, and afterwards quinine and arsenic were given for the relief of the headache, with only partial effect, though she suffered less.

May 10th.—There was still a good deal of headache. A gr. iv. solution of atropia was prescribed, to be used twice a day, and was continued for more than a month.

June 16th.—There had been no headache since the use of the atropia, and only a slight dizziness once or twice. No change in ophthalmoscopic appearances. The atropia was discontinued, and she was permitted moderate use of the eyes.

I have not seen the patient since, but feel sure that she would have reported at once if there had been any return of the symptoms.

DISCUSSION.

DR. RISLEY.—The case of Dr. Harlan recall the case of a young married woman who consulted me two years ago, with asthenopic symptoms. She could not use the eye comfortably for near work. Examination showed slight hypermetropic astigmatism and swelling of the nerve of 2 or 3 D. in both eyes. The veins were full and tortuous, but the calibre of the central arteries was not materially changed. The smaller arteries were tortuous as far as they could be seen. The margins of the disc were markedly obscured, and there was choroidal disturbance in both eyes. There were no hemorrhages. There had been no dizziness, and no more headache than could be accounted for by the eye strain. There was no albumen or sugar in the urine, and no increased flow of urine. She claimed to be in perfect health. The existing refractive error was corrected by + 1 D. cyl. axis vertical. With this, V. = $\frac{20}{xx}$. She returned one year later, the asthenopic symptoms having been relieved, but the appearance of the eye-ground remained the same.

DR. MITTENDORF.—I should like to report a case which has been under observation for more than a year. It had been examined by a number of physicians, who were unwilling to admit that the condition was normal. The picture was so much like that of neuritis, that it was thought that it was a case of latent neuritis with good vision. The lady sought advice on account of granular lids and compound hypermetropic astigmatism. She has been under observation for a year, and no change has been noticed. With glasses, V. = $\frac{20}{xxx}$. We ascribed the appearance to an abnormal development of the connective tissue elements of the optic disc. We did so because there was this silky appearance of the retina.

DR. KIPP.—There are cases recorded in which the patients have been under observation for nine or ten years.

TWO CASES IN WHICH RÄHLMANN'S HYPERBOLIC LENSES IMPROVED VISION.

BY G. HAY, M.D.,
BOSTON, MASS.

CASE I.—Mr.——, aged twenty years, law-student, has noticed lately he does not see as well as formerly. Has without glasses vision $\frac{12}{40}$. The corneæ look somewhat prominent, and when examined with the ophthalmoscopic mirror at a distance of some inches they appear, with slight movements of the mirror, to be irregularly shaded. The corneal images are irregular.

I regarded the case as one of slightly developed conical corneæ, with irregular astigmatism.

1875, July 2.—I prescribed convex cyls. R. $+\frac{1}{16}$c axis 180°. L. $+\frac{1}{12}$c axis 180°. Each eye with its glass had vision $\frac{12}{20}$, and without any glass $\frac{12}{40}$.

These glasses were tested several times subsequently without finding any spherico-cylinders materially better; although they did not help for reading, but only for distance, and this especially in the evening by artificial light.

In 1877, I also prescribed some concave cyls. for reading, which seemed at the time to help, although not corresponding in position of axes with the convex cylinders. They were, however, of little use.

After learning of Rählmann's hyperbolic lenses (see Berlin klinisch. Wochenschrift, 1880, and Klinisch. Monatsblätter für Augenheilkunde, 1881) it seemed desirable they should be tried in this case, and accordingly it was found that,

1884, January 26.—The left eye likes 0.5 system B, and the right likes 1. system A.

January 28.—L. likes 0.5 system B., R. likes 0.5 system A.

January 29.—The patient likes these lenses for reading, after trying them at home. The glass for the L. being rather better than that for the R.

April 6.—Patient likes the glasses obtained, likes them especially for reading.

June.—Has broken one of his hyperbolic lenses and wishes it replaced. The vision with the convex cylinders is very nearly as when they were first prescribed in 1875.

CASE II.—1882, March 18.—Miss ——, aged *circa* twenty years, has pronounced conical cornea of each eye; no opacity at apex noticed.

I advised, R. —6.0 cyl. axis 15°. Vision of R. hardly greater than $\frac{12}{200}$, L. +2. sph. ⊂ —4.0 cyl. axis 135° with vision nearly $\frac{12}{80}$.

April 5.—Glasses obtained are as prescribed, and the L. has with its glass $\frac{12}{80}$ +.

1884, February 1.—L. with hyperbolic lens 1. A. has $\frac{12}{40}$ +. 1. A. is better than 2. A. and than 0.5 A.; 1. A. is better than 0.5 B. and a little better than 1. B.

L. likes 1. A. better than the spherico-cyl. of March, 1882.

February 2.—R. with 2. A. has $\frac{12}{30}$. Both together, R. 2. A., L. 1. A., have about $\frac{12}{20}$. With the spherico-cyls. of 1882 patient has $\frac{12}{70}$.

April 16.—With the glasses imported has vision very nearly as with my test-glasses; has with both eyes together, and also each separately, vision $\frac{12}{20}$, the vision depending however on the position of the glass before the eye.

This circumstance as regards the position of the glass was noticed by the other patient, who however considered the glasses as useful.

A CASE OF MYXŒDEMA WITH ATROPHY OF THE OPTIC NERVES.

BY O. F. WADSWORTH, M.D.,

BOSTON.

IT is only quite recently that the disease known as myxœdema has excited much attention; its pathology, beyond the fact that there is a deposit of mucine in the subcutaneous tissues, is still unknown; and even the symptoms observed in the cases reported have presented in some respects con-

siderable variations. Although symptoms pointing to disturbance of the cerebral nervous system have occurred in some cases, no affection of the eyes, in particular of the optic nerves, has, so far as I am aware, been described. It may therefore be of interest to put on record the following case, in which there was atrophy of the optici. It may well be that the optic atrophy was only coincident, and had no direct connection with the myxœdema. Yet primary atrophy, as this evidently was, when it affects both eyes, is of comparatively seldom occurrence as an independent lesion.

Mrs. C., aged forty-two, a large, strongly built woman, applied to me at the Boston City Hospital, June 27, 1884, because of failure of sight. She was in fairly comfortable circumstances, and since an attack of measles, when fourteen years of age, had never been sick. She had been married twelve or fifteen years, but never been pregnant. Her catamenia had been regular till three years ago, when they ceased.

Some seven years ago her fingers and hands, and two or three years later her feet and the lower part of her face, lips, nose, and eyelids began to increase in size. The enlargement gradually became greater, and for a long time she had been obliged to have her boots made for her, being unable to find any large enough. Her speech became somewhat thick and slow, and her movements slower than formerly. Except for an occasional feeling of numbness in the parts affected, and of burning in the feet and legs, there had been no special discomfort. Of late, however, she had experienced slight dyspnœa on active exertion. Failure of sight was first noticed a year and a half ago, and had continually progressed. Careful enquiry both of her and her husband failed to elicit any history of pains anywhere. She had never had headache. There had been no failure of intelligence or memory. Her appetite was good, bowels somewhat sluggish, micturition normal. She slept heavily.

The lower part of the face was full, heavy, of waxen hue, the natural folds obliterated; the lips full; the nose large, its alæ broad and thick; the eyelids baggy. The hands and

fingers were large and square, the thickening being most pronounced on the palmar surface, where the tissues could be pinched up in thick folds and gave the feeling as of an excessive development of subcutaneous fat. The feet were very large and broad, the swelling not extending above the ankles, and, although there were large varicose veins of the right leg, there was no pitting here or elsewhere. The tongue was large and rather pale. The skin was not dry to the touch, but she stated that she never perspired. The thyroid was of normal size. Auscultation revealed nothing abnormal in heart or lungs. Temperature and pulse were normal. The patellar-tendon reflex was present. There was no anæsthesia of the skin. The urine was normal in every respect.

Examination showed the conjunctiva, cornea, and iris to be normal in both eyes. Movements good. R. only perception of light. L. V. = $\frac{2}{3}$; F. contracted in all directions, but to much greater degree upward and outward. Media clear. In both eyes the discs were sharply defined, gray with slight bluish tinge, without vascularity; the central vessels, both arteries and veins, small; in other respects the fundus normal.[1]

DISCUSSION.

Dr. Little.—Have you looked for the condition in other cases? I have examined the eyes in seven or eight cases, but have found no changes.

Dr. Wadsworth.—I have looked for it, but have not found it.

[1] Some weeks later the patient was admitted to the hospital, to the surgical and local department, and remained for about a month. During this time her general condition remained the same, but the color of the left eye [illegible] was recorded as twenty-seventieths, but when I saw her last, at the end of September, and a fortnight after she had left the hospital, it was twenty-fortieths to twenty-fiftieths. No farther symptoms had developed.

A REPORT OF THE EXAMINATION OF THE EMPLOYEES OF THE PENNSYLVANIA RAIL ROAD AS TO COLOR SENSE, ACUTENESS OF VISION, AND HEARING.

By WILLIAM THOMSON, M.D.,
PHILADELPHIA, PA.

An instrument for the detection of color blindness described in our Proceedings of four years ago, a modification of Snellen's Letters in the form of a disc, and a series of rules and regulations prepared by the writer, were adopted by the officers of the P. R. R., and have been used in the examinations of their employees in signal duty, and is in use now in the selection of all men who enter the service. The road operates five thousand miles of track, situated in six different states, and has about fifty thousand employees, of whom from ten to twelve thousand have to do with signals.

Upon each of the fifty divisions there are two examiners, who are instructed by the Surgical Expert in their duties, their results being recorded on blanks, which contain all the information needed by the Division Superintendent, who can transfer to other duties men below the standard, or refer them for final examination or treatment to the Surgical Expert. The rules and regulations and blanks have already been published, and can be obtained from the General Manager, Mr. Charles E. Pugh, who, in a letter dated April 20, 1884, says: "In approaching the completion of the task of examining those men in our service (more than twelve thousand employees having now been submitted to your system), I desire to express to you our entire satisfaction with the rules and regulations, tests, and instructions prepared by you, as well as with the personal supervision, instruction of examiners, and examinations and decisions of all doubtful cases, and persons referred to you for final action."

"Our reports satisfy me that about four per cent. of color blind, and ten per cent. defective in vision, have now been removed from the service, or transferred to other duties where they can do no injury; and that the great dangers to the public and to the other employees of loss of life, and to the company of possible destruction of property, have been averted so far as these defects are concerned."

"I am frequently asked by prominent officers of other railways, and government officials, to give an opinion as to the practical usefulness of our system of examinations, and it affords me much pleasure to emphatically commend it in all its details; and I feel that we have good reason to be satisfied with this the first successful attempt to bring the entire body of men engaged in signalling upon a large railway under control by the practical application of scientific facts. Having eliminated these dangerous persons from our present force, we propose to keep it free from them in future by a steady application of our present system."

I will add that so smoothly has the entire system been worked that no change has been found necessary. The example of this, the most important road in the country, in the wise employment of scientific knowledge can now be safely followed by others, or might be made the basis of legislation should it be found requisite.

A CASE OF ACUTE DACRYO-ADENITIS.

By THOMAS R. POOLEY, M.D.,
NEW YORK.

Acute inflammation of the lachrymal gland is of sufficiently rare occurrence to make it worth while for this reason alone to report an additional case, but the one I am about to put on record showed another interesting feature which makes it especially worthy of mention.

The patient, a healthy German girl of about twenty-four

years, had been for several years under my treatment for chronic trachoma, at the dispensary of the Ophthalmic and Aural Institute. She came about once a week to have the lids touched with copper and the inverted lashes pulled out.

The second day after her last appearance in the dispensary, March 9th, 1884, she was brought to my office with a most intense and characteristic diphtheritic inflammation of the conjunctiva of the left eye. The lids were red, hot, tense, and so swollen as to render it impossible to evert them.

The palpebral conjunctiva, so far as it could be exposed to view, was covered by a dense, tenacious, firmly adhering, yellowish-white membrane: there was intense chemosis, surrounding the cornea like a mound, and the latter was opaque, yellow, like chamois leather. It was evident that this eye was doomed, and the next day, in spite of the constant use of cold compresses, the cornea had entirely sloughed.

In a few days the blennorrhœic stage set in, and there was a copious purulent discharge from the eye. About three weeks later, when the purulent discharge was beginning to abate, I was sent for in great haste to go and see the patient, with the information that the other eye had become infected.

I found, however, a very different state of affairs, although the appearance of the eye was well calculated to alarm the patient and her friends. There was very great swelling of the lids, especially of the upper one, at the upper and outer angle of the eye; they were intensely red, and hot to the touch, but not so tense as those of the other eye had been. The area of swelling extended to all the cellular substance of this side of the face, so as to make it red and brawny. On raising the lid, the upper, outer part of the ocular conjunctiva was seen to be chemotic, and easily protruded between the palpebral fissure. When the patient was directed to look well downward a tumor presented itself in the cul-de-sac. There was a slight displacement of the eyeball downwards and inwards, but no marked exophthalmos.

Upon palpation a tumor, the border of which was well defined, was found in the upper outer orbital fossa, which was exquisitely sensitive to pressure; but no distinct sense of fluctuation could be obtained.

There was no secretion from the eye except of a watery character. And the conjunctiva, except for the changes caused by the old trachoma, appeared normal.

The patient suffered intense pain, and was dreadfully frightened. Her temperature was 100° only, but her pulse 120.

Hot applications were ordered to be made constantly, and she was given large doses of quinine and tincture of the chloride of iron. The next day, as the swelling was undiminished, I made an incision in it through the lid, but did not obtain any pus. Hot compresses were continued. In the afternoon of the day following there was marked improvement. The swelling had subsided sufficiently to admit of the eye being slightly opened, and there was much less swelling of the face. The hot applications were now made for an hour three times a day only, and a pressure bandage applied in the *interim*. From this time on the improvement was very rapid, the swelling disappeared, last of all from the region of the gland, which could be felt for some time as a sensitive tumor. At my last visit, April 10th, she was about well, and I have not seen her since.

In order to see how common an affection acute inflammation of this gland is, as well as to gather such other facts in regard to it, which may be of interest, I have collected the views of some of the best text books, which I herewith briefly give. Mackenzie (4th Am. Edition) describes two forms of inflammation of the lachrymal gland.

(1) Inflammation and suppuration of the glandulæ congregatæ, which is by no means of uncommon occurrence, and has somewhat the appearance of an ordinary stye, for which it often passes. The external angle of the eyelids is swollen, red, and painful, and if the upper lid is raised several of the acini of the congregate glands are seen to be enlarged. In the course of a few days one or more of them point and discharge pus on the inside of the upper lid, close to the commissure. Sometimes, on pressure, a long thread of pus can be seen oozing from one of the lachrymal glands. Considerable pain attends the suppuration of the congregate glands, and not unfrequently there is chemosis of the conjunctiva of a whitish color, with puriform secretion from the membrane.

(2) The glandula innominata, or superior portion of the lachrymal gland, is liable to become inflamed, constituting from the part affected and the deepness of its seat, a much more serious affection than the first described. This form is by no means common. The symptoms are—Pain in the seat of the gland, increased fullness above the external angle of the eyelids. By and by red, tense swelling, at the upper and outer angle of the orbit, the upper lid can be raised with difficulty, if at all, the conjunctiva is inflamed, and the eyeball pushed forward from the orbit.

When the inflamed gland is enlarged to the utmost, the sympathetic swelling of the neighboring cellular substance, and the chemosed conjunctiva advance so much in front of the globe of the eye as to conceal it completely. The pain in orbit and head becomes more severe, and unless the progress of the inflammation is arrested, fever, restlessness and delirium usher in the local symptoms of suppuration, fluctuation becomes distinct, and at last the matter points and bursts, by one or more openings, through the upper lid.

The causes are:—Blows on the external angular process of the frontal bone, slight lacerated wounds of the lids, and exposure to cold. Mackenzie quotes from a number of cases reported by Mr. Todd, in the Dublin Hospital Reports, vol. iii. p. 408, 1822, the fact that the greater number of the cases observed by him were not idiopathic, but succeeded to inflammation of the conjunctiva or some other form of ophthalmia. Mackenzie likewise describes a chronic non-suppurative form, but with this we have not to do. Soelberg Wells (Treatise on the Eye, 4th Ed.) describes but briefly an acute and chronic form, the latter the more common. His description tallies in the main with that of Mackenzie, but no differential diagnosis as to the part of the gland affected is made.

He says, too, that the inflammation of the gland may supervene upon chronic inflammation of the conjunctiva or cornea.

Stellwag (4th English Ed., p. 492) says that inflammation of the lachrymal gland is usually chronic in character and has been but rarely observed. Occasionally it runs a very acute course. Wecker (Ocular Therapeutics, English Translation, p. 517)

says, inflammation of the lachrymal gland is very rare. It is perhaps impossible to distinguish between it and phlegmonous inflammation of the cellular tissue of the gland. Nettleship (Treatise, p. 61) makes the same division into two forms that Mackenzie does. The gland may be the seat of acute or chronic inflammation, and in either case pus may form. In the chronic form the enlarged and projecting gland cannot be distinguished from that caused by a morbid growth either in the gland or neighboring part of the orbit. In the acute form there are the usual signs of inflammation—local heat, tenderness, and pain, with swelling, which may obscure the margins of the gland.

In all cases, if the enlargement is great, the eyeball is displaced, and the oculo-palpebral fold of conjunctiva in front of the eyeball is pushed forward and downward so as to project more or less between the lids and the eye. When an abscess forms it sometimes may be opened from the conjunctiva, but more often points to the skin, through which the incision must be made. If the abscess be allowed to break spontaneously a troublesome fistula may be the result. A little abscess (see Mackenzie) sometimes forms in one of the separate lobules forming the anterior part of the gland, the main body of the gland (the "superior lachrymal gland") remaining free. There is limited swelling and tenderness of the deep lid structures at the upper and outer angle, not passing back beneath the orbital rim; the yellow head of the abscess may be seen pointing through the conjunctiva near the oculo-palpebral fold and the tarsal cartilage—a position which serves to distinguish this abscess from a suppurating meibomian cyst. Inflammation of the lachrymal gland, whether acute or chronic, is commoner in children than in adults, and in women than in men.

The case herewith reported presents the usual diagnostic features delineated by the authorities quoted. I was not aware, however, until looking up the matter, that a distinction in diagnosis as to the part of the gland affected had been made, nor does it seem to me to be essential to make such a differentiation. In this case, however, from the severity of

the symptoms, the size of the swelling, which extended back into the orbit, it would seem that the whole gland was involved.

The authors referred to all agree that the affection is often associated with affections of the conjunctiva, or cornea, of a chronic form. The interesting and unusual feature in my case is the occurrence of an acute inflammation of the gland, during the course of an acute diphtheritic inflammation of the other eye, and raises the question in my mind whether it may not have been caused by septic absorption. The general health of the patient was very greatly impaired, and the slight rise of temperature may have been due to a mild septicæmia. In regard to treatment, hot applications, with the systematic use of pressure, together with incision should the abscess point, is all that is required. Although I have seen a small number of cases of chronic and sub-acute inflammation of the lachrymal gland, this is the only instance in which the case has run such an acute course.

DISCUSSION.

DR. KIPP.—I have seen a number of cases in children which I considered to be inflammation of the lachrymal gland.

DR. KNAPP.—Mono-lateral inflammation of the lachrymal gland is not so very rare. It can be distinguished from other affections in this locality by the feeling of the gland. If the finger is pressed boldly into the orbit, a nodular swelling will be detected, which is painful and shows that the inflammation is limited to the gland. It is rarer to see the inflammation in both glands simultaneously or shortly after one another. In a recent paper Galezowski reports about twelve cases from his own practice. I am sure that if more attention had been directed to this affection, it would have been found more frequently. The prognosis is good. The cases which I have seen had no infectious origin, and in the majority of instances no conjunctival complication. Most of them did not suppurate.

DR. MITTENDORF.—The paper referred to by Dr. Knapp is, I think, the report of an epidemic occurring in an infant asylum.

I think the interesting feature of Dr. Pooley's case is that it probably was of septic origin.

DR. POOLEY.—I should like to ask Dr. Knapp, if the bilate-

ral cases were not subacute or chronic. I saw a case presented by Dr. Loring to the New York Ophthalmological Society, but I did not think that it was anything but a chronic inflammation.

DR. MILLER.—I have seen one case of bilateral acute inflammation of the lachrymal gland. It was sent to me by the family physician, who supposed it to be a case of gonorrhœal ophthalmia. There was great swelling and exquisite tenderness. The diagnosis was not difficult. The patient had gonorrhœa at the time. The inflammation subsided in three days without suppuration, under hot water dressings.

MULTIPLE COLOBOMATA OF THE IRIS, OR POLYCORIA CONGENITALIS.

By W. F. MITTENDORF, M.D.

NEW YORK.

THE infrequency of this condition will, I hope, excuse me for reporting two cases of this kind. Double pupils, congenital as well as traumatic, are not rare, but five pupils in one eye are not often seen.

CASE I.—Mrs. R., a young married lady, of Massachusetts, came to me complaining about the condition of her left eye. Not only was her vision very poor, but the light was very distressing to her eyes, and, besides this, there was sympathetic irritation caused by a staphylomatous bulging of the right eye. Seven years ago the right eye was lost after an extensive ulceration of the cornea. There is now a total adherent leucoma, the iris is firmly mixed up with the cicatrix. It becomes inflamed and painful on the least exposure, and it has undermined her general health. The patient consented to its removal. The impaired vision of the left eye is due to compound myopic astigmatism, which is corrected by $-8_{.}$ $\bigcirc$ $-18_{.}$ ax. 115°; this combination gave her a V. $= \frac{20}{30}$, but a short time after the use of the glasses and the removal of the right eye it rose to $\frac{20}{20}$?

The most curious appearance of this eye is due to the large number of pupils; there are five of them. The largest one is near the centre; it is slightly oval, but otherwise normal. On the nasal side there is another pupil, on a horizontal line with the central one; it is about half the size of the first, measuring 3 m.m. in a horizontal and 2 m.m. in a vertical direction; it is conical in shape, the base corresponding to the corneal border. On the other end of this horizontal line, on the outer corneal border, another pupil is seen, about half the size of the one on the nasal side; it is also conical in shape, and the base of the cone is formed by the corneal border.

In a vertical line with the central pupil, on the lower corneal border, is the fourth pupil, which is only a little smaller than the one on the nasal side. On the upper portion of the sclero-corneal junction the fifth and smallest pupil is seen; it is only about 1.5 m.m. long and 1 m.m. wide. All these pupils are apparently alike in structure; around the border of them a different pigmentation of the iris is very marked, and it looks as if they were all supplied with a muscular apparatus, but this is only apparent, as upon the use of a mydriatic only the central one dilates, or contracts if a myotic is instilled into the eye; the rest are somewhat changed, according to the action of the muscular apparatus of the surrounding iris-tissue.

On ophthalmoscopic examination, the red reflex of the fundus is readily noticed through all of them, but through the lower and also the inner one the edge of the lens is distinctly seen. It has somewhat of a dark, sharply defined border, which crosses nearly in the centre of the aperture. The outer and upper pupils are so small and so near the periphery, that the lens is not visible. The details of the fundus are readily seen through the central pupil, and a number of vessels (not, however, the disc or macula), can be observed through the inner and lower one.

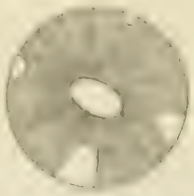
The lady has no difficulty in using this eye; but she has been using glasses which did not correct the error of refraction properly, and had on this account imperfect vision, which was improved by the sphero-cylindrical glass to $\frac{20}{30}+$. Her range of accommodation is very good, $= \frac{1}{3}+$, which would

indicate that no anomaly of the ciliary muscle exists. If the eye is covered in such a way that only one peripheral pupil is left free, she is able to see large objects, but not very distinctly. She thus sees the movement of a hand at a distance of several feet; but she uses the central one alone for ordinary vision. Her field of vision is only very slightly affected, as the second best pupil is at the nasal side, where her rather prominent nose limits the field in that direction; in a downward direction her perception goes to 80°; in the outer part it reaches to nearly 90°; but this is hardly due to the temporal pupil, as this is very small.

When in bright sun-light she has always complained about its dazzling effect, and I have added therefore a slight blue tint to her concave-cylindrical glasses, which seems to give her great comfort.

The lady tells me that her father has also a very peculiar looking eye, very much like hers, but she cannot tell whether there are a number of pupils in it or not, as she was not aware of their existence in her own eye. At my request her family physician examined the eye of the father, and reports to me that it is so.

The trouble is different from the usual forms of arrest of development, because a want of some of the radiating fibres of the iris would create a more or less triangular defect, and a congenital iridodialysis would be shallower than these pupils. The arrangement of pigment around these openings is exactly like that of the central pupil.



Case II. is that of the father of the lady. In this case the right eye is affected. He has besides the central one, a pretty large second pupil just below the former; it is larger than the former, and at the very periphery of the iris. It is oval in shape, and divided by a thin band of tissue into two parts, of which this drawing will give an idea. The old gentleman says that neither his father nor mother had anything unusual about their eyes, and believes firmly that it is due in his case to exposure of the mother at the time of the

eclipse, in 1806, about five months before his birth. His mother and her sister (both pregnant) were very much interested in the event, and spent considerable time in watching it. The sister's eyes became inflamed immediately following, and she suffered considerably, but her child when born had perfect eyes. His mother's eyes were not affected, and she as well as he believes that, had they been so, the child would have escaped this deformity. The relation between polycoria and this maternal impression is certainly quite interesting.

The defect in the father's case is evidently caused by imperfect closure and partial displacement of the fœtal fissure, it being in the median line of the eyeball. In the daughter's case, hereditary transmission plays the most important rôle. Both cases are remarkable on account of the absence of accompanying defects of the choroid or the lids, and the unusual shape of the peripheral colobomata. Only few cases of this kind have been recorded; those of Sæmisch, Talko, and Rumschewitsch (Centralblatt für Augenheilkunde) are similar to mine. Deutschmann's view, that nearly all the cases of arrest of development, and consequently also those of colobomata, are due to intrauterine inflammatory processes, such as a sclero-chorio-retinitis, can hardly explain the occurrence of these defects, because there are no intra-ocular changes.

DISCUSSION.

DR. SEELY.—These cases are certainly interesting, although all of us probably have seen cases of polycoria. I intend to publish the history of a family in which a number of the members have polycoria. The interesting point is that all these patients have become blind. I should like to ask Dr. Mittendorf how old his patients were.

DR. MITTENDORF.—The daughter was thirty-two years old and the father sixty-five.

DR. NORRIS.—Will Dr. Seely state in what way his patients have gone blind?

DR. SEELY.—Apparently with choroiditis.

REMOVAL OF FOREIGN BODIES FROM THE VITREOUS BY AID OF THE ELECTRO-MAGNET.

BY JOSEPH AUB, M.D.
CINCINNATI, O.

THE cases I am about to report are such as occurred in my practice during the past four years.

From 1875 to 1881 I had, eight different times, attempted the removal of pieces of gun-cap, iron or steel, from the vitreous by aid of forceps. Twice the ordinary horseshoe magnet was called to assist in the operation. Six of the eight cases were relieved of the foreign body, but in two I utterly failed. In all cases the operation was followed by severe inflammation, and enucleation of the eyeball had to be performed sooner or later, either by myself or some other oculist.

In 1881, after Dr. Bradford had described his electro-magnet, a case came into my hands in which it seemed to me the magnet could be advantageously used, and I immediately procured one, and used it successfully. Since then other successfully operated cases have occurred in my practice. During last fall, Hirschberg, in the "Centralblatt für Augenheilkunde," reviewed the book of Dr. Snell of England, "On the Use of the Electro-magnet in the Removal of Foreign Bodies from the Eye," and in studying this review I was exceedingly surprised at the few successful operations reported; for up to that time my cases had all been successful. My cases were such as occurred in the usual run of practice, and were not specially selected for that purpose. Since last fall I have had one case in which the electro-magnet failed to remove the foreign body, and where enucleation was subsequently performed. Thinking my cases of sufficient importance, and hoping the discussion would enable me to ascertain the views of others with more experience in this particular direction, I have continued

to report them to you. The histories are copied from my case books.

July 13th, 1881. 9 A.M. Mr. Jos. Shoenberger presented himself, and stated, that "an hour ago he was struck in the right eye by a piece of iron." On examining his eye, I found a wound in the outer margin of the right cornea at the termination of horizontal meridian, a vertical incision 2‴ in length; the foreign body seeming to have penetrated the iris and to be lodged in the vitreous. T.–1. Both anterior chamber and vitreous are filled with blood. Ordered, atrop. sulph. gr. i.—3 iv. Cold applications to be continued. S. = perception of light.

July 13th. 4 P.M. Very little pain. Pupil dilating slowly.

July 14th.—Blood in anterior chamber slowly disappearing. Sight same.

July 15th.—Considerable chemosis, iris contracting slowly. Pupil irregular. On outer portion of iris is seen what seems to be a scale of iron covering an opening in the iris. Lens clear. S. $= \frac{1}{200}$.

July 16th.—Chemosis much less. Fundus still perfectly dark. No pain. Ordered purgatives.

July 17th.—Pupil moderately dilated. Anterior chamber clear. The incision wound was enlarged both upwards and downwards. The electro-magnet point was introduced, and the piece of iron withdrawn; its weight was $\frac{3}{4}$ of a grain. The incised and bruised iris upon which it had rested was withdrawn and excised. Considerable bloody liquid vitreous escaped; the anterior chamber was rapidly filled. Atropine was instilled and compress bandage applied.

July 18th.—No pain. No reaction. Wound closed. Iris looks well. Fundus still dark. S. $= \frac{1}{200}$.

July 19th.—Pupil dilating. Swelling of conjunctiva less. Anterior chamber clearer.

July 20th.—Improving slowly. Vitreous much clearer. Red reflex from fundus.

July 23d.—P. has been doing well. No pain. Vitreous opacities being rapidly absorbed. S. $= \frac{2}{200}$.

July 24th. In vitreous, immediately behind the outer lens

margin, is a small dark object, stationary, and resembling a foreign body. No reflex from its surface.

July 28th.—The fundus much clearer. Optic disc can be indistinctly recognized. Foreign body still in same position. S. = $\frac{2}{200}$. P. complains of momentary shooting pains. A fresh incision was made in the cornea, just in front of old incision, and 3‴ in length. The smallest point of the Bradford magnet was introduced into the anterior chamber and pushed slowly between the edge of the lens and ciliary processes. The foreign body was seen to move and become attached to point of magnet. It was removed through the incision, and fluid vitreous escaped. T. – 1. The foreign body was a scale of iron weighing $\frac{1}{2}$ grain, and very irregular at its edge. Atropine instilled and compress bandage applied.

July 29th.—Wound closed. No reaction. Light seems clearer.

August 3d.—P. progressed rapidly. On outer corneal margin is an irregular dark stain. Anterior chamber clear. Lens intact. Vitreous clearing. S. = $\frac{20}{200}$.

August 9th.—Conjunctiva less injected, almost white. S. = $\frac{20}{50}$ easily.

August 12th.—Entire fundus clear. No opacities to be seen. S. = $\frac{20}{15}$ (?). P. has some astigmatism, but eye is still too sensitive to allow further test.

September 15th.—Eye white. Wound firmly united. Lens and vitreous clear. S. = $\frac{20}{15}$ (?). T. – 1. No improvement with cylindricals.

May 10th, 1882.—P. has been steadily at work all winter, without suffering in the least. Condition of eye same as reported September 15th, 1881.

Case II.—Heinrich Shrott, aged forty-two, called to see me April 1st, 1882. One week ago was struck in the right eye by a chip of steel. The foreign body had penetrated the cornea at the limbus, passed through the anterior chamber at the angle, and passing through the posterior chamber had entered the vitreous without injuring the crystalline lens. The patient was under treatment of a colleague who had instilled atrop. sulph. Through the dilated pupil the foreign body

could be seen floating in the vitreous, surrounded by coagula. He was told to remain under the physicians who were then treating him.

June 5th, 1882.—The patient returned with the statement, that the physicians under whose care he had been, insisted upon enucleating the eye. The eye had become painful in the past few days, and the other eye was showing symptoms of sympathetic irritation. The patient consenting to the attempt at removal of the foreign body, I accepted him as a patient. The eyeball was deeply injected, cornea clear, anterior chamber and pupil free, lens clear, except that on the posterior surface five or six minute lines of exudation could be seen running parallel to the outer periphery. Fundus clear, and in the lower and outer periphery near the ciliary processes I could detect a distinct metallic reflex. Corresponding to this point was the greatest point of tenderness. The patient was anæsthetized that afternoon and operated upon. The conjunctiva and Tenon's capsule were dissected from the lower sclerotic, exposing the tendon of the inferior rectus. An incision was made through the sclerotic, from the point of adhesion of tendon, back through the tendon and in the direction of the muscle, extending about $2\frac{1}{2}'''$. The centre of one sclerotic lip was slightly indented. The smallest point was fixed to the electro-magnet and introduced and moved in the direction of the ciliary processes on which the metallic reflex had been recognized. After 15 seconds it was withdrawn, and the piece of steel found attached. It weighed one and one half grains, was 3 m.m. in length and 1 m.m. in width at the widest point.

The wound was brought together with one suture uniting the sclerotic opening and one suture attaching the conjunctival flap and Tenon's capsule. Ordered atropine and compress bandage. No reaction followed. No tenderness nor swelling. On the 9th inst. the sutures were removed, and compress bandage reapplied.

June 10th.—S. $= \frac{20}{200}$. Striated opacities on posterior lens capsule clearing up.

June 12th.—Doing well. Gradual clearing of lens surface. Vitreous clear. Wound united. No tenderness. S. = $\frac{1}{10}$.

June 16th.—S. = $\frac{1}{5}$. Pupil ad maximum dilated. No pain. Lens opacities in statu quo.

June 24th.—S. = $\frac{2}{3}$. Stopped atrop. sulph. With $\frac{1}{4}$ 8 P. reads Jæger No. 3. P. allowed to go to work.

June 28th.—P. has been working three days. No reaction. Eye is doing well.

July 2d.—S. = $\frac{20}{40}$. No pain. Eye white. Pupil contracted. Reads Jæger 1 easily without glasses.

August 6th.—S. = $\frac{20}{30}$. P. has been at work steadily. Has had no trouble. Opacities on posterior lens capsule gone. Fundus perfectly clear, except at point of incision where the whitish sclerotic is seen surrounded by pigment.

Sept. 1st.—With + 30 cyl. axis 45° S. = $\frac{20}{15}$. Reads J. 1 easily.

July 1st, 1883.—Condition same as last September. No trace of wound externally. S. = $\frac{20}{20}$ without glasses.

June 27th, 1884.—No change in condition of the eye.

Case III.—Ben. Bender, aged twenty five, called to see me April 3d, 1883, and stated that about one hour previous to his visit a small chip of steel flew into his eye. At inner corneal margin, corresponding to the horizontal meridian, I found an incision about 1½‴ in length, into which the iris had prolapsed. Pupil was drawn towards wound. Ant. chamber empty. Lens clear. Through the contracted pupil I examined the fundus with the ophthalmoscope, and found in the lower and outer portion of the fundus an extravasation of blood, emanating from a rent in the choroid. This blood seemed to cover a foreign body. Ordered eserin. sulph. gr. i.—3 ii. every three hours, and compress bandage.

April 7th.—No change has taken place, except that the wound has not closed and the prolapsus iridis is increasing. Advised abscision.

April 10th.—P. consenting, the prolapsed iris was drawn out of the wound and abscised. No reaction followed, and the corneal wound united in twenty-four hours. Bandage was removed on the 14th inst, when S. = $\frac{20}{15}$. Eye was free from

irritation. Pupil reacting nicely, although keyhole shaped. The ophthalmoscope revealed the foreign body imbedded in the tissues of the eye, at the point where first supposed. The choroid was swollen around it, the blood had disappeared, but the edges of the ruptured choroid were covered with pigment deposits. P. was allowed to go to work, but kept under observation until May 9th, when he left for New York. He returned May 30th, and stated that on the cars he felt his eye paining him. On examination, nothing external could be seen. The ophthalmoscope revealed the fact, that the foreign body had become dislodged from its position, and was lying at the bottom of the eye. P. was warned of the danger, and advised to have foreign body removed.

June 14th.—P. has been under observation almost daily. On the 13th the eye became very painful to touch, reddened, and sight disturbed. He was urged to have the operation performed; but only on the 15th, after assuring him that under no circumstances would I enucleate the eyeball, did he consent to the operation. Pain was not materially increased, but the injection was well marked, and the eye painful to the touch. The fellow eye showed signs of irritation.

June 15th.—After placing the patient under ether, an incision was made through the conjunctiva and capsule of Tenon, halfway between the external and inferior rectus, and about 3‴ from sclero-corneal margin. The parts being held apart by hooks, an incision of $\frac{1}{4}$″ was made into the sclerotic and in meridianal direction. The upper end of this incision was extended 1‴ at right angles to original incision. The small point of Bradford's magnet was introduced, and after ten seconds the foreign body was removed, attached to the point of the magnet. Two drops of vitreous were lost in the operation. The wound was closed by a suture with double needles, introduced from inner scleral surface on either side of incision, and embracing sclera, capsule and conjunctiva. Cold applications were ordered for twenty-four hours.

June 17th.—No reaction followed. Very little swelling. Pain is all gone. Sight seems clearer.

June 18th.—Suture removed. Only slight conjunctivitis from the thread in conjunctival sac. No pain on pressure.

June 23d.—S. = $\frac{20}{70}$. Eye white. Pupil clear. Lens clear. Fundus shows some swelling at point of incision. Vitreous clear. P. was discharged.

May 2d, 1884.—P. called at my request. S. = was $\frac{6}{9}$, and could read Jaeger No. 1 without glasses, but slowly. Pupil clear. Fundus clear, except at point where foreign body was originally imbedded, and at the seat of the operation. At the first place we had the characteristic appearance of rupture of the choroid. At the point of incision an atrophy of the choroid, corresponding to the shape of the incised wound and surrounded by pigment, can be seen.

Case IV.—The last case is that of Louis Eibes, aged twenty-seven, who was injured in the right eye by a piece of steel, the afternoon preceding Thanksgiving day, 1883, and who called to see me Friday morning, forty hours after receiving the hurt. I found a large irregular central corneal wound, through which lens substance was escaping. Pupil contracted, anterior chamber empty, but iris free from injury. Lens capsule extensively ruptured, and cortic alis opaque. I could not recognize details of fundus; but the patient insisted that the foreign body was not in the eye, but had rebounded. He stated that the piece was too large to have entered the eye through such a small wound. Atrop. sulph. and cold compresses were ordered. The pupil dilated only moderately; corneal wound did not close firmly till after the twelfth day; and from this circumstance, I came to the conclusion that the foreign body was still within the eye. The lens was gradually absorbed, and at the end of six weeks the eye was perfectly white, pupil closed, and the pupillary area closed by thickened capsule. No pain on pressure. The patient had been at work since December 15th.

January 10th, 1884. Patient suddenly experienced intense pain, which lasted all night. When he called to see me next morning, he had marked irido-cyclitis, with increased pain on pressure. The left eye was injected, had photophobia and profuse lachrymation, and could only read with extreme diffi-

culty. I urged the necessity of an operation, but only obtained his consent after three days, and then only upon promising to do my utmost to remove the foreign body and attempt to save the eyeball. An incision was made similar to the one in Case III., the end of the magnet introduced and pushed through the vitreous to the opposite side, the point of extreme tenderness being at the inner lower angle. The sclerotic was seen to be indented as if drawn towards the point of the magnet, but upon withdrawing the magnet the foreign body was not attached. Repeated attempts were made, but all proved unsuccessful. Several drops of vitreous were lost in these attempts. The sclerotic wound was closed, and the eyeball, which was somewhat collapsed, was then enucleated. Recovery without any accident. The left eye, a week after the operation, had recovered perfect vision, and was entirely free from irritation.

The enucleated eyeball was opened immediately after the operation. On the ciliary body near the lower inner angle of the eye we found a dense mass of fibrinous exudation. Within this the foreign body was found, spear shaped, very pointed at one end and broad at the other, with ragged edges. It was so firmly imbedded that it could be removed only with the forceps, and then only by exercising considerable force. I feel assured that had the attempt been made immediately after the injury or after I had been convinced of the presence of the foreign body, the foreign body could have been removed, and if not sight restored, at least the eyeball been preserved.

DISCUSSION.

DR. KNAPP.—When the foreign bodies in the vitreous can be seen the difficulty is not very great. The question has been whether we should attempt to get them out when they can not be seen. Some such cases have been reported. Three or four months ago, I succeeded in getting a foreign body out where the lens was opaque and the body could not be seen.

DR. MITTENDORF.—I think that Dr. Aub should be congratulated on his success. I have removed several foreign bodies, and I feel the weight of Dr. Knapp's remarks in refer-

ence to our ability to see the body. I had a case two years ago in which a foreign body had entered at the nasal side and passed through the lid into the posterior tissues of the ball. The particle struck with great force. The anterior and vitreous chambers were filled with blood. The wound was large and in the region of the ciliary body, and I thought that the eye would be lost if the body were not removed. I introduced a magnet, but did not succeed in finding the body. I concluded that the body had gone through the vitreous and was to be found on the opposite side.

I rotated the ball upwards and inwards and made a valvular incision behind the ciliary body. I then introduced a magnet and had the satisfaction of removing a piece of iron which weighed eight or ten grains. The man, of course, has no vision, but he has the eye.

Dr. Pooley.—I should like to ask if any one now uses the permanent magnet?

Dr. Knapp.—Permanent magnets which, at best, are only temporarily strong, soon become permanently weak.

In regard to foreign bodies in the vitreous chamber, it is a very nice thing to attempt their removal, and occasionally we succeed, but from my own experience and from a study of the literature, I sometimes thought that it would be best to take all such eyes out, without any scruple. I am sure that by proceeding in this way, the greatest good would be done to the greatest number. More eyes containing foreign bodies are destroyed by surgical interference and temporising treatment than would be if we took them all out at once. One case of sympathetic ophthalmia weighs heavier, is a greater misfortune to humanity than ten cases in which one eye was removed, but the other preserved intact. It is a very gratifying clinical performance to extract, with a magnet, a piece of steel from the depth of the vitreous chamber; the students wonder and applaud, but only a few cases are really benefited for a length of time. The development of a good deal of ciatricial tissue, cyclitis, etc., are apt to follow in the wake of the brilliant operation, and nobody can tell whether and how long the fellow eye will remain unaffected.

Dr. Mittendorf.—I endorse Dr. Knapp's views.

Dr. Harlan.—There is danger in hesitation. This was illustrated in a case seen at Will's Hospital. A man presented himself with a wound in the cornea, but was positive that the foreign body had rebounded. The eye seemed to be in such good condition that we decided to give it a chance. He continued to improve, and we should have discharged him.

if a little irritation of the other eye had not presented itself. We decided to extirpate. In the operation, great difficulty was experienced in cutting the optic nerve. After the operation, it was found that the body, a splinter of iron one inch long, was lying in the course of the optic nerve and sufficiently included in the sclerotic to hold it in place.

DR. AUB.—I should like to ask if any of the members have noticed cases of foreign bodies passing into the vitreous without injuring the lens.

DR. HUTCHINSON.—I have seen such a case in a blacksmith named Angell, from Newport, N. Y. He had a white scar in his cornea, and at the lower portion of the lens were two small white cicatrices. In the globe, with the ophthalmoscope, could be seen behind the lens a round tumor, where unquestionably a foreign body had lodged and become encapsuled. The cornea, aqueous, lens and vitreous were quite clear. There was considerable impairment of the visual field.

DR. AUB.—I meant without traces of an injury.

DR. KNAPP.—I remember one case where a piece of gun-cap entered at the border of the cornea and went through the iris without wounding the lens, and it seems without injuring the ciliary body. I succeeded in getting it out with a curved hook.

The case has another interesting feature. Five years after the successful extraction of the foreign body with vision $\frac{20}{30}$, a cyst developed at the place where the body went through the iris. I took the cyst out as well as I could, but it had deep attachments in the ciliary region which, no doubt, I had not removed completely. The cyst relapsed, grew much larger than before, and extended deeply into the ciliary region. The lens was uninjured and sight was good. The case was so important that I sent the patient to Dr. ——— to obtain his opinion. My own view was to try and remove the cyst, if it could be done, and scrape its walls clean out, but if I did not succeed in doing this, to remove the eye. Dr. ———'s opinion was in favor of removing the cyst together with the lens and the adjacent part of the iris. I could not assent to this plan of operating. To remove a healthy lens and scrape the ciliary region, I thought was about as risky a thing as could be done, and almost sure to produce cyclitis. It is dangerous enough to remove a ripe cataract when traction instruments have to be used, but to scoop out a healthy lens, especially in children, is doubly dangerous. I removed the anterior part of the cyst together with a piece of the iris, and extracted the posterior part in shreds by means of a hook and

forceps. Then I entered the ciliary region at least twenty times with a sharp spoon, until I felt sure that nothing of the walls of the sac was left. My expectation was that I would have to remove the eye in a day or two. The eye, however, got completely well, and vision was almost normal. That was seven years ago. It goes to show how much can be done with a healthy eye. This was at a time when antisepsis was not thought of.

Dr. Mittendorf.—I have removed a small needle-shaped piece of iron, which was visible through the iris. I tried the permanent magnet and failed, and had to draw the iron out. It was one-fourth of an inch long. The lens were perfectly clear, and remained so for two or three weeks. That was two years ago.

Dr. Little.—I remember a case seen prior to the use of the electro-magnet, in which a piece of foreign material entered the eye through the cornea, passing between the ciliary muscles and the lens. The body could be seen in the vitreous below. The man refused enucleation. In this case we had the opportunity of watching the progress of encapsuling. There was no sympathetic irritation. The man finally passed from observation. I think that Dr. Aub was very fortunate in not having sympathetic irritation in the other eye develope more frequently. In two cases recently seen, the foreign body passed through the sclera behind the lens, becoming imbedded in the ciliary region, and in one case, inside of three weeks the other eye began to show sympathetic irritation; in the second case, inside of six weeks the other eye became irritated.

Dr. Aub.—In case number three, sympathetic irritation had set in at the time that I performed the operation. His physician had insisted on enucleation. I removed the foreign body. In that case there was only sympathetic irritation, not inflammation.

Dr. Knapp.—I should like to report one more observation in regard to the location of foreign bodies. Last winter I treated a boy for sympathetic ophthalmia. I removed the other eye, and found in it a string of fibrous tissue stretching from the outer and anterior to the inner and posterior side. The body, a bird-shot, lay encapsuled upon the posterior external side of the sclerotic, at some distance from the optic nerve, which was not particularly diseased. It lay in the region of the posterior pole of the eye. It had not passed through the ciliary region. I have never seen another foreign body lying on the external side of the sclerotic.

Dr. Gruening.—I enucleated twelve years ago an eye of a

woman sixty years of age, who had been shot through the cornea in childhood. I found a small shot just outside of the globe, and three or four millimetres to the side of the optic nerve. There had been throughout life a good deal of sympathetic irritation, but never any symptoms pointing to sympathetic inflammation. The irritation disappeared after the enucleation.

Dr. Seely.—We have always heard of the removal of foreign bodies with the magnet. I should like to ask what has been done in the way of diagnosticating the presence of a foreign body by means of the magnet?

Dr. Knapp.—In the absence of Dr. Pooley, I beg to say that we have often tried, but never succeeded in diagnosticating the presence of foreign bodies with the magnetic needle.

Dr. Kipp.—I saw a case in which another physician had determined with the magnet that there was no iron in the eye. I removed the eye and found a large piece of iron.

Dr. Green.—In regard to foreign bodies getting into the eye without injuring the lens, I will state that a gentleman came to me a few years ago stating that sometime before he had been shot, and that a bird-shot had entered the eye. There was a small cicatrix at the lower scleral border, showing where the shot had penetrated, and a small false pupil at the same site. In the bottom of the vitreous chamber, and partly covered with exudation, was the lead shot. It had been there several months, and had caused no apparent irritation. Vision was normal, and the lens clear. I tried to keep track of the case, but a year later, I learned that the patient had died of some acute disease.

Dr. Wadsworth.—I should like to state in this connection, that in three instances following injury from a foreign body, I have seen the whole lens become opaque, in one instance remaining so for several weeks, and then clear up. In the latter case, the man had been advised to have the eye removed, with which advice I agreed. The lens was quite opaque for some weeks, but it afterwards cleared up so that a good view could be obtained of the fundus. It remained transparent for a number of months at least. Two years later the man came to me because he was having difficulty in seeing at his work. At that time the lens had again become cataractous. There was no sympathetic trouble in the other eye, but it had become presbyopic.

So long as I had the other two cases under observation, the lens after having become transparent remained clear.

A CASE OF HYPERMETROPIC REFRACTION, PASSING WHILE UNDER OBSERVATION INTO MYOPIA — SYMPTOMS SIMULATING GENERAL NERVOUS DISEASE.

By S. D. RISLEY, M.D.
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In the issue of the American Journal of the Medical Sciences for October, 1880, I published with careful detail the history of four cases of eye disease, which while under observation passed from hypermetropic to myopic refraction; both conditions having been carefully determined, after the prolonged and vigorous use of a mydriatic.

I now desire to place on record in the annals of this society an additional case. The report is prompted also by the somewhat remarkable history, which clothes it with additional interest, as showing how the symptoms of a low grade of choroiditis attended with a gradual distension of the eyeballs, in a nervous girl, with a peculiar family history, may simulate serious mental and nervous disease.

L. B., aged ten years, a pale, nervous child with transparent skin, black hair and eyes, restless nervous manner, was brought to me in March, 1877, by the advice of her physician, Dr. C. R. Prall, of Philadelphia, for an opinion as to some possible relation between her nervous symptoms and eye strain.

She suffered constantly from headache, which, commencing in the brow and temples, radiated to the occiput and nape of the neck. She had been taken from school in consequence of an attack of chorea, which threatened to return when school was once more resumed, all the symptoms being aggravated by the use of the eyes at a near point. Examination revealed well marked choroido-retinal irritation, with undue sensitiveness to light, and a crescent of choroiditis embracing

the temporal half of both optic nerves. $V = \frac{20}{xx}$? in each eye. After thorough use of sulphate of atropia continued several days, she selected for each eye $+ \frac{1}{60}^{s} \bigcirc + \frac{1}{60}^{c}$ ax. 90° with which V. $= \frac{20}{xx}$, the accommodation being paralyzed. This glass was ordered to be worn except at her out of door sports. Under its use the choreaic symptoms and headache promptly disappeared.

One year later she was again brought to the office with a return of all the symptoms. The mother stated they had supposed she was well and that the glasses were no longer necessary, so they had been gradually more and more neglected and finally laid aside entirely. The mother now came in a very despondent mood, and laid before me a distressing family history. During gestation with this child she had been in a condition bordering on puerperal mania: that a later child had been born with cleft palate; that the child's maternal grandfather and an uncle had died with "softening of the brain"; that another uncle had died at seventy-three years of age after months of imbecility; and that a cousin aged twenty-two was then in an asylum for the insane.

The child was now said to be dull and spiritless, got on badly at school, slept badly and complained constantly of being tired. There were no choreaic symptoms, but she suffered once more from the fronto-occipital pains, aggravated by the use of her eyes.

A new home had been established in Boston and the family were on the eve of a removal. She was advised therefore to resume the use of her glasses, and if necessary consult some ophthalmic surgeon in Boston.

I saw no more of the patient until June, 1883,—now a young lady of rare beauty and to all appearance in perfect health. She came, however, because of her headache and inability to use her eyes. She related that during the intervening years she had been unable to pursue her studies except by the aid of tutors, her lessons being read to her, or taught by other devices calculated to spare the use of her eyes. She had been notwithstanding a constant sufferer from headache. She had consulted Dr. Williams of Boston, and Dr. Agnew of

New York, both of whom elicited the above family history of the patient, and after careful analysis she thought were disposed to regard her eye symptoms as a part of her general condition, and carefully regulated her general course of living, the former calling in also the aid of the optician for a pair of resting glasses.

Feeling that all, therefore, had been done in that direction, I once more sought carefully for some local condition which might account for the prolonged inability to use the eyes. This course was strongly suggested in the first place by her greatly improved health, and furthermore by the fact that the headache, although quite constant, was nevertheless exaggerated by the use of the eyes or by exposure to strong light. It was now found that V. had sunk to $\frac{20}{}$ and the eye ground could be seen distinctly only with a concave glass.

There was much pigment absorption throughout the eye ground, and a narrow, well marked semi-atrophic crescent at the site of the former choroiditis. In the periphery of the eye ground, to the limit of the ophthalmoscopic picture, there were numerous dull pigment clouds. Externally the anterior perforating vessels were full, and presented a marked feature over the bluish sclera. A solution of sulphate of hyoscyamin gr. ii.—f℥i. was prescribed, to be used thrice daily in each eye. This was continued four days. Under it the headache disappeared, and the vision improved. In O.D. to $\frac{20}{}$, calling many letters correctly in xx. With —.25^c ax. horizontal V. = $\frac{20}{xx}$ readily and most of the letters in xvi. were called correctly at 20′. In O.S., however, —.25^c ⌒ —.50^c ax. hor. was necessary, and with it V = $\frac{20}{}$, miscalling the confusion letters. These glasses were ordered to be worn constantly for distance, and a weak convex combination giving a common far point, with weak prisms bases in, for continuous near work at her books and piano.

The result was very gratifying, since six months later, she had had no return of her symptoms. It seems, even in view of the facts, incredible that so weak a correcting glass should have been even an important factor in relieving her long standing trouble. She nevertheless assured me, when I sug-

gested the omission of the distance glasses, that she was afraid to go without them, since even a brief interval of omission was sufficient to bring on a sense of discomfort.

The conclusion seems justifiable that at least the head symptoms from which this young woman suffered, and the inability to use the eyes, were the consequence of a low grade of choroiditis, resulting in a disturbance of the nutrition of the sclerotica, and gradual distension of this ordinarily unyielding membrane. It is an important inquiry whether, if the original correcting glasses had been faithfully worn, these years of suffering and interruption of the educational process might not have been prevented.

DISCUSSION,

DR. KNAPP.—A great many cases of astigmatism in young ladies of a nervous temperament have been reported. A great many have come to me supplied with all kinds of glasses, prescribed by regular oculists, without being relieved. In the most of them I found sight, refraction and accommodation normal. I have simply advised these patients general hygiene, and they have got well. I think that in these nervous girls, where sight and refraction are normal, it is commonly not necessary to give glasses, or if they are used, it should be temporarily only. Many patients are not able to recognize a refractive error of $\frac{1}{48}$. It requires the ophthalmoscope to detect it. With the ophthalmoscope, those who are practised in determining the refractive condition in the erect image, determine an error of $\frac{1}{72}$ quite readily.

I do not wish to be understood as criticising Dr. Risley's case. I only wish to express my opinion on the extensive use of very weak convex glasses, both spherical and cylindrical. To prescribe glasses to almost every patient, that has not a coarse, organic lesion, seems so much to be the tendency of the day, that very soon oculists will be called refractionists, as twenty-five years ago they were called iridectomists.

DR. SEELY.—I did not understand Dr. Knapp's allusion to small amounts of astigmatism. I think he said that a small amount of astigmatism, if under $\frac{1}{72}$, might be ignored. It must have been a remarkable experience which has not found great inconvenience when the astigmatism amounted to .5 D.

DR. KNAPP.—I know that some people derive great comfort from $\frac{1}{72}$ cylindrical; spherical glasses of and below that

strength, for young people, are, in my opinion, nothing but placebos, the same as $\frac{1}{144}$ cyl. which I have seen prescribed.

Dr. Settly.—I think so too, but I think that it is likely to increase if not corrected.

Dr. Hay.—I think that there must be a great difference of opinion on that subject. I remember hearing at the meeting of the International Ophthalmological Society in New York, one gentleman, I think that it was Dr. Loring, say that as a rule myopia should be fully corrected. I would only say that I have not persuaded myself of that. It is not my custom to advise glasses in small degrees of myopia. I give glasses which do not fully correct the error, and even then I prefer to give weaker glasses for reading.

As regards the diagnosis of refractive errors, I would trust the patient's vision for astigmatism of .5 D rather than my own eye. On account of the little variations in the light, or in the position of the patient's eye or of my own eye, I could never be sure of small differences.

Dr. Theobald.—It seems that the best indication for the correction of slight degrees of astigmatism is the presence of asthenopic symptoms. And this rule holds good also in the lower grades of myopia; for when asthenopia is present in this condition, it seems to be due to a disproportion between accommodation and convergence. In these cases, the correction of the myopia restores the normal relation between convergence and accommodation, and the asthenopic symptoms disappear. On the other hand, when there is no asthenopia in low degrees of myopia, and accommodation is so related to convergence that no discomfort is experienced, correction may not be necessary.

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